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CATECHISM
OF
PRACTICAL AGRICULTURE

CATECHISM

OF

PRACTICAL AGRICULTURE

BY

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Author of the "Book of the Farm."

"No works demand more conscientious care than educational works"

WILLIAM BLACKWOOD AND SONS
EDINBURGH AND LONDON
MDCCCLVI

In 1 C. 120.

The Author of this Work notifies that he reserves the right of authorising Translations of it.

PREFACE.

In arranging the matter of this Catechism of Practical Agriculture, I could not do otherwise than follow the plan I had adopted in the *Book of the Farm*, as I still believe no plan is better suited to teach practical agriculture *off a farm*, to one entirely ignorant of it, than following through the successive seasons the routine of operations as performed on it. This is the method I have adopted in that work; and the correctness of my judgment in doing so has now for a number of years unequivocally received the sanction of public approbation.

In a work professing to treat of the use of machines, woodcuts are obviously required to give a clearer idea of their construction than any description, however luminous, can possibly do; and these accordingly have been employed to the utmost extent compatible with the elementary character of the work. Figures of certain operations which involve many particulars of detail are also given, in order to show the details at a glance.

Should this little work find its way into the public schools of the country, Teachers might extend the questions largely on every subject treated of, and introduce others on a few subordinate subjects that have been purposely omitted in order to retain the work within reasonable compass. Some acquaintance with practical agriculture would easily enable them to originate questions. It might also be advisable to exhibit working specimens of hand-implements, and show the manner of using them. Other machines than those figured might be traced with chalk upon a black board, and their superiority or inferiority to the machines given, pointed out. Drawings of the cultivated plants in their different states of growth, and of the varieties of live-stock usually reared, might be placed before pupils with much advantage. Samples too of the various grains and seeds sown on farms would at once impress upon the memory of pupils their identity and use.

By means of such a course of tuition in the school, and exemplified on the neighbouring farms, the occupants of which would doubtless be willing to second the views of teachers, a large amount of correct agricultural knowledge would be imparted to young boys and girls, destined to earn their livelihood on farms, and which at present is only obtainable by labour in the fields, to the serious neglect of other kinds of knowledge only to be acquired at school. Thus, by combining a professional with the usual education to young farm-labourers of both sexes, a larger portion of their time might be spent at school than there is, greatly to their own advantage in mental culture, and to that of their masters as securing servants of superior capacity.

H. S.

REDBRAE COTTAGE, EDINBURGH,
14th November 1855.

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CATECHISM

OF

PRACTICAL AGRICULTURE.

WINTER.

How is the agricultural year divided?

The agricultural year is divided into four seasons—Winter, Spring, Summer, and Autumn.

Why is winter placed first in order?

Because winter is the season in which preparation is made for the work to be done in the other seasons.

PLOUGHING.

Which is the chief preparatory work in winter?

Ploughing the soil; but other works of importance in winter are, thrashing and dressing grain, pulling and storing turnips, feeding live-stock, forming dunghills of farmyard manure.

Of what use is ploughing the soil in winter?

Ploughing the soil in winter pulverises it, as also by exposing it to the air, and especially to frost.

In what state is pulverised soil?

Pulverised soil has all its parts loose and dry.

How does the plough pulverise the soil?

The plough pulverises the soil mechanically, by rubbing against, dividing, and crushing it.

How does frost pulverise the soil?

Frost freezes the moisture in soils into ice, whose expansive power breaks down the hardest clods into powder.

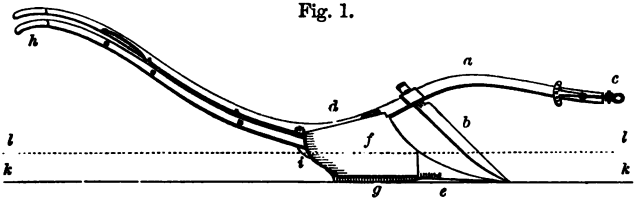
On what kind of soil is frost most efficacious?

Frost is most efficacious on clay soils, because they are always in a moist state in winter.

Why does the farmer use the plough and not the spade, for turning over the soil?

The use of the spade is more expensive than that of the plough; because human labour is dearer than animal labour.

Fig. 1.



AN IRON PLOUGH.

a is the beam.
b the coulter.
c the bridle or muzzle.
d the body of the plough.
e the sock or share.
f the mould-board.
g the sole-shoe.
h the stilts or handles.
i the side-plates, on the opposite side of the body of the plough from the mould-board *f*.
k k, the black line, is the furrow-sole.
l l, the dotted line, is the surface of the ground.
l k is the depth of the furrow.

Wooden ploughs are now much less common than iron.

Of what construction is the plough?

The plough consists of one beam, one body, and two stilts.

What are the parts connected with the beam?

The coulter and the bridle.

Of what use is the coulter?

The coulter cuts off the furrow-slice from the fast land.

Of what use is the bridle?

The bridle regulates both the depth and the breadth of the furrow-slice, and it is the part of the plough to which the horses are yoked.

Of what use is the beam?

By the beam the horses draw the body of the plough through the ground.

What parts compose the body of the plough?

Besides the frame, there are the sock or share, the mould-board, the sole-shoe, and the side-plates.

Of what use is the sock or share?

The share cuts under and raises up the furrow-slice cut off from *the fast land by* the coulter.

Of what use is the mould-board ?

The mould-board receives and lays over the furrow-slice at a given angle when cut off from the fast land by the coulter, and raised up by the share.

Of what use is the sole-shoe ?

The sole-shoe supports the weight of the plough upon the ground at the bottom of the furrow, and it answers as a slide.

Of what use are the side-plates ?

The side-plates prevent the earth of the fast land from falling into the body of the plough.

Of what use are the stilts ?

As levers, the stilts enable the ploughman to maintain the correct line of draught, and the required depth and breadth of the furrow-slice, determined by the bridle.

How does the ploughman guide the horses ?

Partly by means of double reins, and partly by the voice.

Upon what mechanical principles does the plough act ?

The plough acts upon the principles of the wedge and of the lever.

Of what material is the plough made ?

The plough is now made entirely of iron, as being more durable than wood.

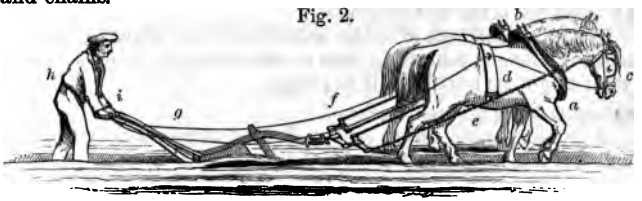
How many horses are yoked to the plough ?

Two horses are yoked abreast to the plough; but when a greater depth of soil than ordinary is required, three or four horses are employed.

How is the plough-horse harnessed ?

The plough-horse has a collar and haims, a bridle, a back-band and chains.

Fig. 2.



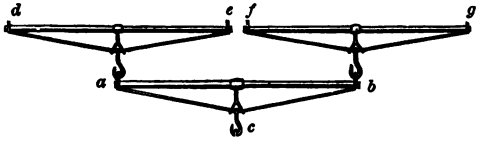
A PAIR OF HORSES, HARNESSED AND YOKED, DRAWING A PLOUGH, WHILE THE PLOUGHMAN GUIDES IT BY THE STILTS.

a is the collar on the horse's neck.
b the points of the haims on the collar.
c is the bridle on the horse's head.
d the back-band supporting the chains *e*.
e the chains attached at one end to the hook of the haims, and at the other to the short swing-trees *f*.
are *the long* master-tree attached to the bridle of the plough, and two short swing-trees attached to the master-tree and chains.
g are the two reins for guiding the horses.
h is the ploughman guiding the plough and horses by the stilts *i*.

How are horses yoked to the plough?

Horses are yoked to the plough by means of swing-trees and chains. The chains are fastened to the haims at one end, supported by the back-band, and fastened to the swing-trees at the other end.

Fig. 3.



COMMON SWING-TREES OF IRON.

a b is the long or master tree.
c is the hook which fixes the master-tree to the bridle of the plough.
d e and *f g* are the short trees, each hooked to an end of the master-tree at *a* and *b*.

The chains from the haims are hooked into the ends of the short trees at *d*, *e*, *f*, and *g*.

Wooden swing-trees are yet much more common than iron.

How many swing-trees are required for the plough?

Three; the long or master tree, which is hooked to the bridle; and two short trees, which are each hooked to an end of the master-tree.

Of what materials are swing-trees made?

Swing-trees are made of wood—sometimes of iron.

When more than two horses are employed, how are they yoked to the plough?

Three horses are yoked abreast, and four horses are yoked two-and-two, one pair before the other.

What other ploughs are used on a farm besides the common one?

There are subsoil, trenching, and double mould-board ploughs.

Of what use is the subsoil-plough?

The subsoil-plough stirs the subsoil without bringing it to the surface, thereby admitting into it rain and air, to make useful what might be hurtful in it to plants.

Of what use is the trench-plough?

A trench-plough brings up any desired proportion of the subsoil and mixes it with the surface soil.

What is the breadth of the furrow-slice turned over by the plough?

Not less than 9 inches.

What are the usual depths of ploughing old lea, turnip land, and stubbles?

Old lea is seldom ploughed deeper than 6 inches. Turnip land ploughed for barley receives a depth of 9 or 10 inches; turnip land for wheat receives 7 or 8 inches. Stubbles are ploughed *as deep as possible in* preparation for turnips and other green

crops, commonly 10 inches. Frequently stubbles are ploughed with three or four horses to the depth of 10 or 12 inches, and even more, if the nature of the soil and subsoil admit of it. It is a good rule to plough deep.

Is the ground ploughed into any particular form?

Yes: commonly into parallel narrow divisions named ridges.

Into what breadth are ridges ploughed?

On moist land the breadth of ridges is 12 feet. When drained, or naturally dry, ridges are from 15 to 18 feet in breadth. When the land is perfectly dry, ridges are put together into widths of 24, 30, or 36 feet; and these widths may be doubled.

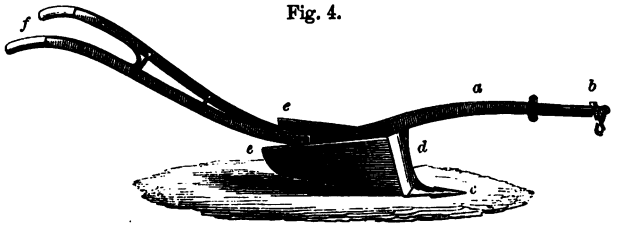
Of what parts does a ridge consist?

A ridge consists of the crown, the two flanks, and the two furrow-brows. The hollow narrow space between the ridges is named the open furrow.

Are there other modes of ploughing land than in ridges?

Land may be drilled and ribbed.

Fig. 4.



THE DOUBLE MOULD-BOARD PLOUGH FOR DRILLING LAND.

a is the beam.	*d* the body of the plough.
b the bridle.	*e e* the two, or double mould-boards.
c the sock or share.	*f* the stilts.

It will be observed that this plough has no coulter, because it is only used in pulverised soil.

How is land drilled?

Land is drilled by laying two furrow-slices against each other in a triangular form with the plough, or by forming two separate furrow-slices with the double mould-board plough.

How is land ribbed?

Land is ribbed by laying over small parallel furrow-slices, distinct from each other, with a small plough constructed like the common plough.

Of the same breadth, do ridges of different lengths take comparatively the same time in ploughing?

No: of the same breadth, the shortest ridges take comparatively longer time to be ploughed, because they oblige a greater number of turns at their ends.

What is the length of ridge that loses the least time at the turnings?

About 300 yards; because longer ridges fatigue the horses, and cause them to walk slower.

Of what length is a day's work?

A day's work embraces ten hours, as long as there is daylight to that extent; and in that time an acre of ground can be ploughed.

Is a day's work continuous or divided?

A day's work should be divided into at least two portions, named yokings, because it is found that horses are injured in health and constitution when worked more than four or five hours at a time.

THRASHING AND WINNOWING GRAIN OR CORN.

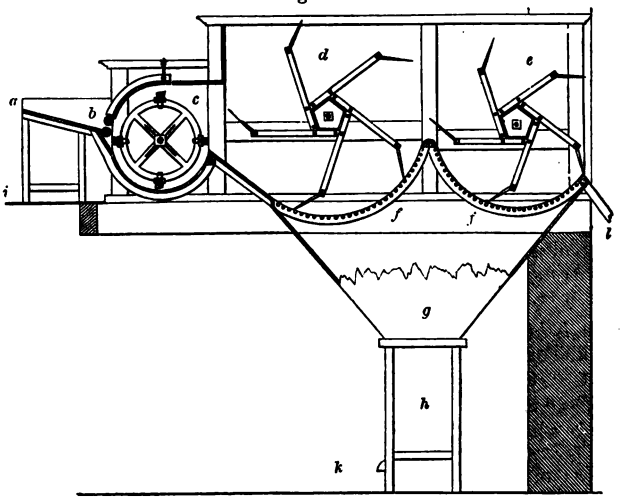
How is separation of the grain from the straw best effected?

The separation of straw from corn is best effected by means of the thrashing-machine.

Why has the flail been given up?

Because by the thrashing-machine the crop is better and quicker thrashed, and at less cost than by the flail.

Fig. 5.



A SECTION IN LENGTH OF A THRASHING-MACHINE.

a is the feeding-in board.
b are the rollers for taking in and holding the sheaf fast.
c is the drum, which beats the grain upwards out of the sheaf.
d is the rake for removing the straw and grain from the drum.
e is the shaker which tosses the straw into the straw-barn *l*.
f f are the screens, which pass the grain through them from the rake and shaker to the hopper *g* of the fanners *h*.
g is the hopper, which receives the grain from the screens, and conveys it to the fanners *h*.
h are the fanners, which blow the chaff from the grain by means of fans.

The sheaves of corn are supplied by two women to the man at the feeding-in board *a* in the upper barn *i*. The grain passes through the screen *f f*, the hopper *g*, and the fanners *h*, into the corn-barn *k*, where it is riddled by two women. The straw is thrown into the straw-barn *l* by the shaker *e*, where it is mowed up by two men.

There are other forms of rake and shaker, but those in the figure are now the most approved.

In the older thrashing-machines the shaker throws the straw over its top into the straw barn.

How does a thrashing-machine operate?

Each sheaf of corn, on being loosened, is placed upon the feeding-in board, from which the rollers draw it in gradually as the drum beats the grain out of it, and throws both straw and grain to the rake, which removes both across the screen below it, when the grain, leaving the straw, drops down between the spaces of the screen through the hopper into the fanners, which separate the chaff from the grain by means of wind from fans, while the straw finds its way to the shaker, which takes it across its part of the screen and throws it into the straw-barn beyond, the grain dropping meanwhile through the screen and hopper into the fanners.

How many persons necessarily attend the thrashing-machine when at work?

Four persons may conduct the thrashing by a machine of small power—one to loosen the sheaves for the feeder-in, one to feed them in, one to take away the straw as it is thrown by the shaker, and one to take away the grain as it comes from the fanners; but a machine of six-horse power and upwards requires two persons to loosen the sheaves, two to take away the straw, two to take away the grain, and one to feed in the corn. Seven persons are thus commonly employed at the thrashing-machine. When horses are employed, an eighth person is required to drive them.

How is the thrashing-machine moved?

The thrashing-machine is moved by means of horses, water, steam, or wind.

What is the best moving-power for a thrashing-machine?

Wind is now scarcely ever employed, being unsteady and uncertain. Horses are much distressed in moving the thrashing-machine. Whenever steam or water can be procured, they are preferred. Water is the cheapest and steadiest moving-power,

where the supply is large and constant. Where water is not constant, steam is the most certain of the moving powers.

Is the thrashing-machine stationary or portable?

In Scotland the thrashing-machine is permanently fixed in a convenient part of the steading. In England, portable thrashing-machines are not uncommon.

Does the grain come from the thrashing-machine in a state fit for market?

It is quite possible to erect such an expensive thrashing-machine as will deliver the grain fit for market; but commonly grain is made ready for market by means of fanners and riddles.

Fig. 6.

DRESSING CORN WITH FANNERS.

a is the fanners.
b is a man driving the fanners.
c is a woman supplying the fanners with corn from a heap with a maund, while standing on a stool.
d is a woman taking away the corn as it comes down the head of the fanners, with a small maund.
e e are two women riddling the corn as they receive it from the woman *d*.
f is a basket for containing refuse from the riddles.
g is the shovel in the heap of riddled corn for shovelling up the heap.
h is the broom for sweeping the floor.
i is the light grain as it falls in the centre of the fanners.
k is the chaff as it is blown away from the tail of the fanners.

In small farms, one riddler, *e*, is only employed, and she helps herself to corn from the head of the fanners.

What is the process of dressing grain?

The fanners, on being placed beside the heap of corn to be dressed, is moved by a man; one woman supplies the hopper with grain from the heap by means of a maund and the assistance of a low stool; another woman takes away the grain from the fanners in a maund; and two women receive it from her on riddles, upon which they retain the small ill-filled grain and other *impurities from the good* grain, and throw them into a basket or

the bushel-measure. Two such dressings are required by wheat and barley, and one by oats.

After a sufficient dressing, what is next done with the grain?

The grain on being sufficiently dressed, is measured with the bushel, and put into sacks.

Fig. 7.

MEASURING AND SACKING CORN.

a is the bushel-measure placed beside the dressed heap of corn.
b is the heap of corn ready to be measured.
c and *d* are two women filling the corn into the bushel by means of maunds.
e is a man, ready, with the strike in his hand, to level the top of the corn in the bushel.
f and *g* are two women holding the sack to be filled.
h is the sack-barrow for wheeling away the sacks as they are filled.
i are the filled sacks placed properly in a corner of the barn.
k are empty sacks ready to be filled.
l is a broom for sweeping the floor.
m is a wooden shovel for trimming the heap of corn into shape.

Only one woman to fill the bushel, and one woman to hold the sack, instead of two, are sometimes employed on the score of economy, but the business is best and quickest done in the way here described.

Where there is a want of hands, as in small farms, the smaller number must suffice.

How is grain measured and sacked?

The bushel-measure is placed beside the dressed heap of corn. Two women fill it at the same time with corn by means of maunds. A man levels the corn in the bushel with a strike. Two women hold the mouth of a sack open, and the man, assisted by the women, empties the corn from the bushel into the sack. When 4 bushels of the corn have been put into the sack, the man wheels the filled sack, on a sack-barrow, to a corner of the barn. Two 4-bushel sacks make a quarter of grain.

How are sacks full of corn conveyed to market?

Corn in sacks are conveyed directly to the market town, or to a railway station, upon carts.

How is a horse yoked to a cart?

The horse is furnished with a bridle, collar, and haims, as for the plough—with a saddle upon his back, and a breeching over his rumps. He is placed between the shafts, and the load is supported upon the saddle, by means of a stout chain fastened by each end to

the shafts. Draught-chains are hooked to the haims, and breeching-chains to the shafts.

How are markets for the sale of grain conducted?
They are distinguished by stock and sample markets.

How is a stock-market of grain conducted?
In a stock-market the grain is presented for sale in sacks, and the bulk of the grain remains upon the carts or at the railway station.

How is a sample-market of grain conducted?
A sample-market consists in presenting the grain for sale in a small sample by hand, instead of the entire grain in sacks.

Is grain disposed of at market solely by measure?
No: grain is disposed of by measure and weight of the bushel.

How is grain weighed?
Grain is weighed with a steelyard, one of which, suited for it, should be in every corn-barn.

What is done with the straw as it comes from the thrashing-machine?
Straw is forked up and tramped down in regular breadths across the straw-barn. Barley and wheat straw are used for litter, and oat-straw for fodder. One end of the straw-barn should always contain litter-straw, and the other end fodder-straw.

PULLING AND STORING TURNIPS.

What are the green crops usually raised on a farm?
In Scotland, turnips and potatoes; and in England and Ireland, turnips, mangold-wurzel, and potatoes. Besides these, carrots, parsnips, and cabbages are sometimes raised.

How are the various kinds of green crops used?
Potatoes are chiefly used as human food; turnips and others are consumed by live-stock.

At what season are green crops taken from the ground for use?
Potatoes are taken up in autumn, and stored; mangold-wurzel, carrots, and parsnips, are taken up before the appearance of frost in the beginning of winter, and stored; turnips are taken up in dry weather at any time during winter and stored, but part is stored in autumn.

When are turnips begun to be consumed?
In October, when the grass begins to fail.

How is the consumption of turnips commenced?
When turnips are to be wholly consumed by cattle in the *steading, the crop is* cleared field after field. When a proportion

of the crop is to be left on the field to be consumed by sheep, the other part is removed for cattle.

What proportion of turnips is usually left on the field for sheep?

Commonly one-half. Where the soil is naturally rich, and in good condition, one-fourth is left; when the soil is in poor condition, the whole crop is eaten on the ground.

In what manner is the proportion of turnips left on the field?

On leaving one-half of the turnips, two drills are taken away and two left alternately; on leaving one-fourth on the field, three drills are taken away and one left.

Are turnips in any way prepared before being removed from the field?

The roots and leaves of turnips are cut off by means of a knife, made of an old sickle with the point broken off.

a is the left hand of the worker.
b is the root of the turnip to be cut off.
c is the place where the leaves are cut off from the turnip.

Turnips injured by cutting, when stored, lose their juices, and often rot. Care is therefore taken not to cut the turnips when rooting and shawing them.

There are many other forms of knives than this for rooting turnips.

Fig. 8.

ROOTING AND SHAWING TURNIPS.

How are the roots and leaves removed by the knife?

The leaves of each turnip are seized by the left hand of the worker: the turnip, on being pulled out of the ground, is held in a horizontal position, when the root is first cut off with one stroke, then the leaves are cut off with another at their junction with the turnip. The severed turnips drop to the ground in heaps, and the leaves are thrown down on the bare ground.

What is the manner of pulling turnips when two drills are alternately left and removed?

A woman goes between the two drills to be removed, and pulls the turnips with her left hand, first from one drill and then from the other. After cutting off the small root, she holds the turnips over the two drills to be left, and drops them in heaps as she severs the leaves with a stroke of the knife, and then throws the leaves on the bare ground. Another woman clears other two drills, and drops the turnips in the same heaps. The bare ground is thus left for the carts to remove the prepared turnips. The leaves are left to manure the ground.

Are turnips given to cattle as removed from the field?

Usually turnips are given to cattle as removed from the

field; but stores of turnips should be made in the beginning of winter at latest.

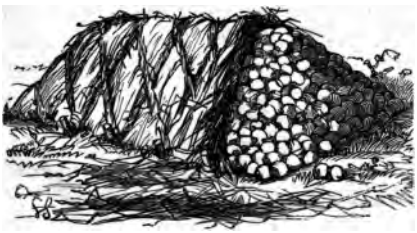
Do carts and horses injure land in rain or frost?

Wet soil dirties turnips. Cart-wheels and horses' feet poach the land in wet weather. Frost hardens turnips so as cattle cannot eat them. Frost freezes the ground, and prevents the storing of turnips. Turnips, when covered up with snow, are troublesome to remove.

What is the best remedy against the injuries of frost, rain, and snow, to turnips?

The best remedy against frost, rain, and snow, is to remove the turnips from the ground, and store them in dry fresh weather.

Fig. 9.



A STORE OF TURNIPS.

A woman piles up the turnips, as they are emptied out of the carts, in a triangular form, while a man prepares straw and ropes for covering the stores.

Stores of turnips are sometimes made flat on the top. If protected from frost, rain and air do no injury to turnips in store.

How are turnips stored?

They are best stored in triangular heaps along dry ridges of a field close to the steading. The stores are covered with straw of sufficient thickness to protect the turnips from frost, and the straw is kept on with straw ropes.

Are all the turnips grown on a farm of the same kind?

No: generally three kinds are cultivated, namely—white, yellow, and swedes.

Is there any advantage in having so many kinds of turnips?

Yes. The white kinds, growing quickly, are the first ready for use. The swedes keep longest, and are last used. The yellow kinds are used between the white and swedes. The three sorts form a regular gradation of food during the season.

FEEDING LIVE-STOCK.

How are live-stock housed during the winter?

Cattle and horses live in the steading, and so do pigs and poultry. Sheep are in the fields, either upon grass or upon turnips.

Cattle.

How are cattle accommodated in the steading?

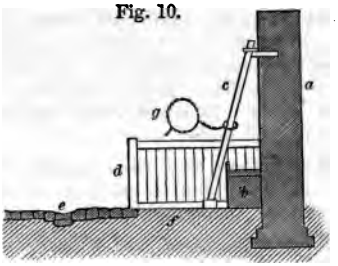
Cows always occupy byres. Young cattle are kept in courts,

having shelter under sheds. Feeding cattle are placed in byres, courts, hammels, or boxes.

a is the outer wall of the byre.
b is the manger for holding the food.
c is the stake, fastened at one end to the wall *a*, and at the other to a stone in the floor.
d is the travis of the stall.
e is the gutter to receive the dung and urine of the animals.
f is the floor of the stall.
g is the chain by which the animal is fastened by the neck to the stake *c*.

Travises or divisions between the stalls are generally made of wood, but sometimes of flag-stones.

Fig. 10.



A STALL OF A BYRE.

Of what construction is a byre?

A byre consists of single or double stalls, each to hold one or two cows or oxen; a manger to place the turnips in; stakes to tie the animals to, by means of an iron chain round the neck; and a gutter to receive the dung and urine from the animals.

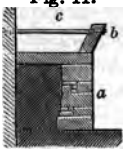
How are courts constructed?

Courts consist of a large enclosed area, with covered sheds for shelter, having mangers for turnips, racks for straw or hay, and troughs for water.

a is a building of stone and lime.
b is a scantling of wood.
c is a rod of iron to fasten the wood to a wall by nut and screw.

Throwing turnips upon the dunghill in courts for cattle is slovenly practice.

Fig. 11.



SECTION OF A MANGER FOR TURNIPS, IN COURTS OR HAMMELS.

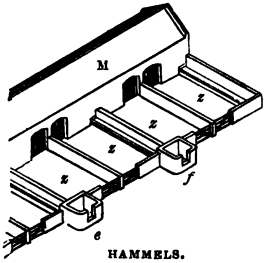
What are hammels?

Hammels have a covered shed, with racks for straw and hay; with a doorway into a small open court, fitted up with mangers for turnips, and a trough for water.

M is a shed for four hammels, each having a doorway into an open court *z*, and fitted up with a manger for turnips, and a trough for water.
e and *f* are stores for turnips, to be used by the cattle occupying the hammels.

Gates admit access into the courts *z* from the road in front of *e* and *f*.

Fig. 12.



HAMMELS.

What are boxes?

Boxes are a series of sparred wooden cribs in a shed, large enough to contain one ox loose in each crib, with a manger for turnips, and a trough for water.

What is the relative situation of animals in byres, courts, hammels, and boxes?

In byres, being tied by the neck, cattle are obliged to remain always on the same spot, under cover in sheds. In courts, cattle have much room to walk about in the open air, with liberty to go under cover in sheds. In hammels, cattle have but a small space to move about in the open air, with liberty to go under cover in sheds. In boxes, cattle have room in their cribs only to turn round on, under cover in sheds.

How is their food given to cattle?

Food is given to cattle three times a-day, at fixed hours—at morning, noon, and evening.

What is the usual food of cattle in winter?

Turnips, with potatoes, oilcake, or bean-meal, form the food of cattle in winter.

How is the food distributed to cattle of different states and ages?

Cows are allowed a small quantity of turnips until they calve, when the quantity is increased to cause flow of milk. Young cattle have as many turnips as they can eat, in order to promote their growth. Feeding cattle have as much food as they can eat: they each consume about 1 cwt. of turnips a-day.

What quantity of potatoes and oilcake is given to a feeding ox?

About a bushel of potatoes, and from 3 to 7 lb. of oilcake a-day are given to an ox, according to its size; and bean-meal is given without stint.

In what state are the oilcake, turnips, and potatoes given to cattle?

The oilcake is broken small by a hand-machine; the turnips are sliced with a slicer or spade; the potatoes are given whole.

Is straw or hay given to cattle?

Straw is put into the racks every day at stated hours, and the cattle eat it, and drink water, between the times they eat turnips. Cattle seldom receive hay.

What sort of straw is the best fodder for cattle to eat?

Oat straw and bean straw are the best fodder for cattle. Barley straw and wheat straw are only fit for cattle litter.

When is litter given to cattle?

Litter is strewn every day in the byres, hammels, boxes, and courts, in such quantity as to keep the cattle clean and dry.

Who takes charge of the feeding and littering of cattle?

The cattle-man.

Sheep.

How are turnips given to sheep?

Turnips are given to sheep on the ground upon which they *have grown, or upon* pasture.

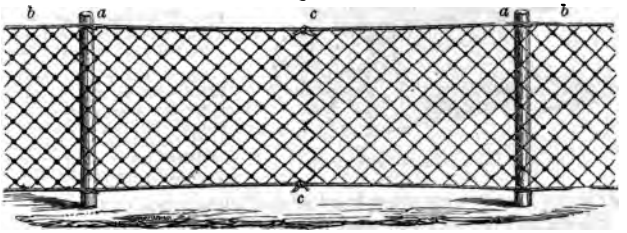
Have sheep liberty to all the turnips of a field at once?

No: sheep are confined upon as much of the turnips as will serve them about a week.

How are sheep confined upon any given space of turnips?

Sheep are confined among turnips with movable nets and hurdles. The nets are made of cord, and supported three feet high by stakes driven into the ground with a wooden mallet. The hurdles are made of wood, and set upon the ground in an inclining position backward, supported by wooden stays, fastened with pins at one end to the hurdles, and at the other end to short stakes driven with a wooden mallet into the ground.

Fig. 13.



A SHEEP-NET SET UP.

a a are stakes of wood, 4 feet long, driven into the ground by means of a wooden mallet.

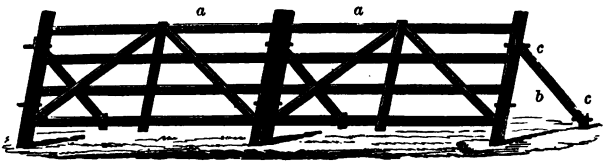
b b are the nets stretched along the face of the stakes next the sheep. The top and bottom cords of the net are turned round and made fast to the stakes by means of a particular knot named the *shepherd's knot*.

c c is the fastening together the ends of two nets.

Care is taken in setting sheep-nets not to stretch them too tight, because, on being wetted with rain, they would be broken by the contraction of the cords.

One man can shift and set sheep-nets from one break of turnips to another, after the stakes and nets have been taken to the field.

Fig. 14.



WOODEN HURDLES SET UP.

a a are two hurdles set, inclined away from the sheep, consisting each of two posts, four rails, one brace, and two diagonals.

b are stays which hold the hurdles in that position.

c c are pins which fasten one end of the stays to the hurdles, and the other end to short stakes, driven into the ground with a wooden mallet.

Two men are required to set up wooden hurdles of the above construction, and carts must be employed to carry them any distance. In England, hurdles are made light and strong, of peeled oak saplings, which are easily set up by one man *and held together with withes.*

Do sheep eat turnips as they grow upon the ground?

Sheep eat white turnips, as they grow, at the beginning of the season. The harder yellow turnips and swedes are sliced with a turnip-cutter, and served to the sheep in small wooden troughs.

Fig. 15.

THE DISC TURNIP-SLICER FOR SHEEP.

a is the hopper into which the turnips are put after being rooted and shawed.
b is the cutting disc which slices the turnips into small pieces, like fingers.
c is the handle by which the worker moves the disc.
d is the board upon which the slices of turnips slide down into the small troughs placed upon the ground.
e and *f f* are handles and wheels by which the machine is moved from place to place.

There are many forms of turnip-cutters for sheep besides this disc cutter. A favourite turnip-cutter in England for sheep is Gardner's, which is neater and more compact in form than the disc.

Do sheep receive any other kind of food than turnips?

Sheep receive oilcake and oats, with salt, in small troughs, along with turnips.

Do sheep receive fodder when on turnips?

Sheep have fresh oat-straw every day, in racks, when on turnips. Ewes receive hay in winter on the snow.

Do all ages of sheep receive turnips in winter?

No: ewes in lamb have pasture reserved for them in winter—turnips making them too fat for bringing forth their lambs in safety. Before lambing, ewes receive turnips, to cause a flow of milk. Young sheep and fatting sheep receive turnips all winter.

In case of snow, or very wet weather, is it proper to allow sheep to remain upon turnips on the land?

Unless the soil is dry, sheep are better in a dry grass field, receiving sliced turnips and oilcake during heavy rain; and hay and oilcake during a great fall of snow.

Who takes the charge of sheep at all seasons?

The shepherd.

Horses.

How are work-horses accommodated in the steading in winter?

Horses occupy the stable, which is fitted up with stalls, containing a manger for straw and hay, and a box for corn. Young horses occupy the courts or hammels.

Who has the charge of work-horses?

The ploughmen, who each work a pair of horses.

a a are the two cast-iron heel-posts.

b b are the boardings of the travises, and the head-posts to keep the boardings in their places.

c is the rack for straw, or grass, or hay, placed low instead of high up.

d is the corn-box.

e is a bar put across the rack *c* to prevent the horse tossing the hay out of it with his head.

f is the floor of the stall.

g g is the gutter for carrying away the urine.

A ring is made fast to the upper bar of the rack *c*, for the stall-collar of the horse to pass through, to fasten him in the stall.

The boardings should be sunk at bottom into a groove of stone rising a few inches above the level of the floor *f*.

The gutter *g g* is best made of stone.

There are other ways of fitting up work-horse stalls, but this is the simplest, strongest, and most open to the air.

Fig. 16.

A STALL FOR A WORK-HORSE STABLE, FURNISHED WITH RACK AND CORN-BOX, AND CAST-IRON HEEL-POSTS.

What is the usual treatment of work-horses in winter?

In the morning early the stable is cleared of foul litter, and the horses are groomed and fed with corn. At noon, after the forenoon's yoking, the horses are again fed with corn. On their return to the stable, after the afternoon's yoking, the horses are again groomed. In the evening the horses are thoroughly groomed, and fed either with corn or with a mash prepared on purpose. Fodder is given to the horses at every return to the stable, and in the evening for the night.

In what state is corn given to work-horses?

Oats is the corn usually given to work-horses, and in a whole state, but bruised oats afford them most nourishment.

How are mashes made for horses?

Mashes are commonly made by boiling in water, in a large boiler, Swedish turnips, barley, and beans, with a little salt, which are covered with straw or hay, cut by a straw-cutter, and cooked by the steam arising from the boiling of the turnips. The cooked mash is put from the boiler into a large tub to be cooled, and from this it is divided in feeds amongst the horses.

How are the young horses in the hammels fed?

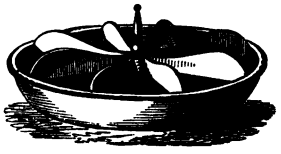
Young horses have straw for fodder, and a feed of bruised oats every day, and a mash once a-week.

Pigs.

How are pigs fed in winter?

Aged pigs are fed to be made into ham. They are fed with boiled potatoes or Swedish turnips, and with barley or pease meal made into thick gruel, three times every day—at morning, noon, and evening.

Fig. 17.



CIRCULAR CAST-IRON PIG-TROUGH.

This is a very convenient form of trough for the drinking food of pigs, to be placed upon the litter in any of the courts. Its subdivisions, which are fixed, prevent one pig from driving away another.

Troughs for sties are made of a rectangular form, of wood, stone, or cast-iron.

How are young pigs treated in winter?

Young pigs get leave to go about, and feed on raw potatoes and turnips; and a drink of gruel or slops from the house is put into a trough for them in any of the open courts.

How are pigs accommodated in a steading?

Feeding pigs are put into sties, each sty having a covered shed and small court, with one trough for food, and another for drink. Young pigs go about in the day, and rest at night in a shed provided for them. Pigs love warmth.

Poultry.

How are poultry accommodated in the steading?

Commonly poultry are very ill-housed in farm-steadings. A poultry-house should be dry and warm, placed near a boiler-house, byre, or stable, and exposed to the sunlight.

What are the different kinds of poultry kept on a farm?

Turkeys, common fowls, geese, and ducks, are usually found on a farm; and also pigeons. Some farmers will not rear geese, deeming them mischievous and dirty.

Are all poultry treated alike?

No: Geese and ducks, not requiring to roost, have a dry, clean, straw-littered floor to stand or rest upon. Turkeys and common fowls, requiring roosts, are provided with them. Being of very different habits, geese and ducks occupy a separate apartment from turkeys and fowls.

How are poultry fed in winter?

All poultry are fed at regular hours three times a-day—at early morning, noon, and afternoon. No farm-produce is better for poultry than boiled potatoes, thick oatmeal-porridge, and corn. *Regularly fed with* all or either of these foods, all sorts of poultry

are fit for use at all times, and eggs are every day obtained from the young pullets. Better have a small number of poultry well cared for and well fed, than a large number neglected and ill fed.

Which is the best breed of fowls?

The Dorking breed is esteemed the best; and the old Hamburg breed is yet also good. Cochin-Chinas are large but coarse, and getting into disfavour. Spanish hens are great layers, but otherwise not equal to the Dorkings. There are several varieties of Dorking, but the speckled is the most esteemed.

Which is the best breed of turkey?

The Norfolk breed with black feathers.

Which is the best breed of ducks?

The Aylesbury breed is deemed the best, having white feathers.

Which is the best breed of geese?

The common breed of geese is yet the best.

How are pigeons accommodated in the steading?

The dove-cot is placed in a warm chamber; as at the end of a byre or stable, in the roof.

How are pigeons fed?

They are fed along with the poultry, and on the same kinds of food; and they repay good feeding and warmth by their earlier and greater fecundity.

MANURE.

How is farmyard manure managed in winter?

The manure from the byres and stables is wheeled daily and spread upon the dunghills, in the open courts, or upon separate dunghills. The manure in the boxes is at times taken away and made into dunghills. Separate dunghills are sometimes covered with a roof, to prevent the rain washing away the soluble parts of the manure. The manure in the open courts and hammels, being always tramped hard by the cattle, is allowed to remain in them until driven out to the fields to be formed into dunghills.

How is the manure from courts and hammels treated on being driven to the fields?

The manure in courts and hammels is driven to the field in frosty weather, and formed into a dunghill. The dunghill is turned over for further fermentation a short time before the manure is applied to the land.

What are liquid-manure tanks, and their use?

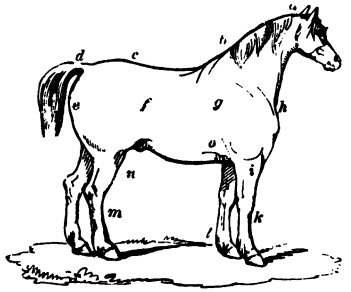
Tanks are pits built in the ground capable of containing the liquid manure, such as urine, as it comes from the open courts, byres, and stables, through conduits under ground, until the liquid manure is used.

How is liquid manure used?

Liquid manure is applied directly to the land from a barrel mounted on wheels, or it is spread over the ground by means of hose in connection with pipes laid under ground from the tanks.

Are there other sources of manure besides the dung and urine of animals?

There are many substances which might be converted into manure by being formed into composts, such as decaying potato-stems, weeds, scourings of ditches, turf, peat-moss, leaves, road-scrapings, flesh of dead animals. These, on being mixed together, and fermented with lime, rape-cake, or manure from the stables, and watered with liquid manure, make large composts, and afford excellent manure.



Profile of a Draught Horse beautifully symmetrical.

The head *a* is small; neck rises with a fine crest from *b h* to *a*; limbs *k l m* taper gradually from the body, and are broad and flat, indicating strength; shoulder slopes back from *h* to *b*, the withers at *b* being thin and high; back from *b* to *c* is short; chest from *b* to *o* deep; top of the quarter from *c* to *d* rounded; flank from *c* to *n* deep; hind quarter from *e* to *f* long; the shoulder muscle at *g* flat and broad.

The entire body seems made up of two large quarters, joined together by a short thick middle, giving the idea of strength and action. The limbs, neck, and head are so attached to the body as to seem light and graceful.

This horse, named Farmer, was a grey; belonged to the Messrs Howey, Edinburgh; and was so powerful as to draw three tons along the streets of Edinburgh.

SPRING.

What is the nature of farm operations in spring?

The farm operations of spring are—to prepare the ground for the seed to be sown in it, and to attend to live-stock while bringing forth their young. The crops sown in spring are spring-wheat, beans, tares, oats, potatoes, barley, and grass seeds.

SPRING-WHEAT.

What is the earliest crop sown in spring?

The first sown crop is spring-wheat. As the sheep clear the land of turnips, the land is ploughed into ridges, and sown with wheat.

How is land ploughed for spring-wheat?

Land for spring-wheat receives only one furrow, the ground being feered according to the form of ridge.

What is feering the ground?

Feering is marking out the breadth of ridges with the plough.

What is the form of ridge usual for spring-wheat?

Commonly single ridges.

Is wheat prepared before being sown in spring?

Wheat is pickled, to prevent the disease of smut attacking it.

How is wheat pickled?

The wheat is poured from the sack into baskets, which are dipped in a tub containing stale urine, or a solution of green vitriol, or a strong brine of salt, and then emptied in a heap upon the floor, and dried by means of quicklime strewed over the heap while being turned over with shovels. (*See fig.* 18, *next page.*)

How is wheat sown?

Wheat is sown either by hand or with machines.

Fig. 18.

THE APPARATUS FOR PICKLING WHEAT.

a is a sack of wheat to be pickled.
b is the basket into which it is put.
c is the tub of stale urine into which the basket of wheat *b* is dipped, by a person holding it by its two handles.
d is the same basket after it has been dipped, set upon the drainer *e*, placed across the mouth of another tub *f*, for the purpose of the wheat getting rid of the superfluous pickle.
g is the heap of pickled wheat begun to be made on the floor of the barn.
h are sacks ready to receive the pickled wheat when shovelled into them.

Slaked lime in powder is strewn over the heap *g*, as it increases in size, through a riddle; and when the whole quantity of wheat to be sown is pickled, the heap is turned over by two men with shovels several times before the lime is mixed intimately with the wheat.

Fig. 19.

SOWING CORN BY THE HAND.

How is wheat sown by hand?

Wheat is sown by hand out of a linen bag, supported over the left shoulder of the sower, leaving his right arm free. On the bag being filled with grain by an assistant, its loose part is wrapped round the left arm, leaving the grain open to the right hand. On taking a full handful of grain, the sower throws it forward, in a scattered form, upon the ground, with a full swing of his arm. Some men sow corn with both hands, out of a suitable form of basket suspended in front.

Who fills the bag with grain?

A woman fetches the grain, in a straw rusky, from the sacks, set at proper distances upon the furrow-brows of the ridges across the field.

How is wheat sown with machines?

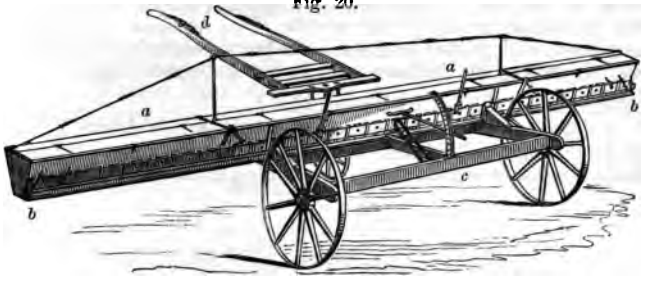
Machines sow wheat broadcast, drilled, and dibbled.

How is wheat sown broadcast with a machine?

The broadcast sowing-machine consists of a long narrow box, mounted on three wheels, and drawn by one horse, and guided by a man. The seed is pushed out of the box, through holes *regulated to a size, to* answer the quantity desired to be sown, by

means of a long spindle, armed with scoops, and set in motion by one of the wheels of the machine. On single ridges the horse walks in the open furrows, and the machine sows two half-ridges at a time. Double ridges are sown with the horse walking along the crown of each ridge.

Fig. 20.



A MACHINE FOR SOWING CORN BROADCAST UPON THE GROUND.

a a is the top of a long box, equal in length to the breadth of a ridge.

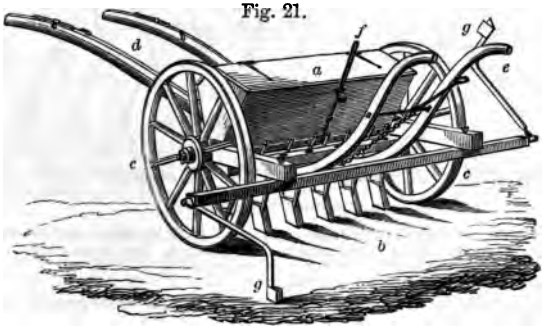
b to *b* is the series of holes out of which the corn issues, and, falling on a board, is distributed broadcast over the ground.

c is the lever for stopping and setting agoing the action of the machine.

d are the shafts for the horse.

The two ends, *b* and *b*, of this form of the machine, hinge over upon the central part, in order to allow the machine to pass through the ordinary gate of a field.

Fig. 21.



A DRILL SOWING-MACHINE.

a is the hopper to contain the seed.

b are the coulters which make the ruts in the ground to receive the seed from the hopper by the spouts.

c c are the wheels supporting the whole machine.

d are the shafts to which the horse is yoked.

e are the handles held by the conductor of the machine.

f is the lever which regulates the issue of the corn from the hopper.

g g are the markers to show the breadth of ground occupied at each turn of the machine.

Drill-machines for sowing corn are much more generally used in England than in Scotland.

Most of the English drill sowing-machines are very complicated, and of course costly, and liable to derangement. The simple form of machine represented in the figure does its work as well as the most complicated and costly ones.

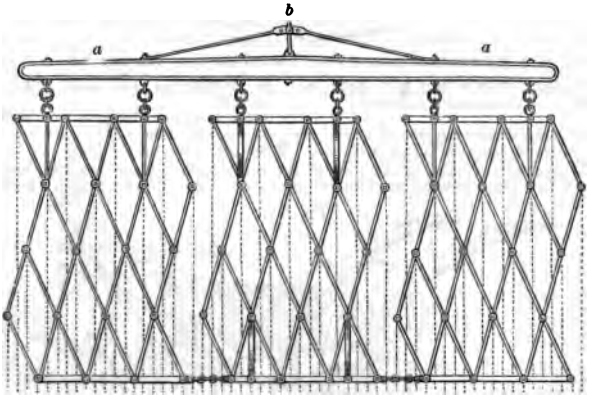
How is wheat sown in drills with a machine?

The drill sowing-machine is provided with a large hopper for seed, which supplies a number of spouts enclosed in coulters, which form parallel ruts in the ground for the reception of the seed. The hopper and coulters are supported on wheels. The issue of the seed is regulated by a spindle, armed with scoops, set in motion by one of the wheels. The machine is drawn by one horse, and guided by a man. Wheat is sown in drills across the ridges, and the drills are nine inches and upwards apart.

How is wheat dibbled with a machine?

A dibbling machine is moved either by hand, or drawn by one or more horses. The seed is pushed into the ground through hollow tubes in certain numbers at stated distances.

Fig. 22.



IRON RHOMBOIDAL HARROWS.

a a is the long tree to which three harrows are attached, by means of rings and bolts. The harrows are linked together at the bottom by means of short chains.

b is the hook by which the harrows are attached to the master-tree of the swing-trees.

The rhomboidal form makes the tines rut the surface of the ground at equal distances.

The most common form of rhomboidal harrows is made of wood.

Is the ground treated alike prior to being sown with wheat in broadcast, in drills, and dibbled?

The wheat is sown broadcast from the hand, and by the machine, upon the ground as it was left by the plough; and it is covered in with harrows, passed along and across the ridges. Wheat is sown in drills, or dibbled, after the ground has been made smooth by the harrows. The surface of the ground is made smooth after the machine by a single passage of the harrows *along the rows of* drills.

Is the quantity of wheat sown the same, whether sown in broadcast, drills, and dibbled ?

Broadcast sowing requires the most seed, dibbling the least, and drilling a medium quantity. Broadcast-sowing with the machine requires less seed, and scatters it more regularly than broadcast-sowing by hand.

How late in spring may wheat be sown ?

Ordinary varieties of wheat are sown till the latter end of March. Bearded April wheat, and red chaff beardless spring-wheat are sown in April.

BEANS AND PEASE.

When are beans and pease sown in spring ?

Beans and pease are sown in February or March.

Are beans and pease sown on every kind of soil ?

Beans succeed best in soils having a large proportion of clay. Beans, with manure, will grow on any soil, except peat. Pease are grown on lighter soil than beans.

Do beans always receive manure ?

On clay soils, in good clean condition, beans receive no manure. Beans succeed with manure best on light soils.

How are beans cultivated ?

Beans are cultivated in rows and in broadcast.

How are beans cultivated in rows ?

Beans are cultivated in rows either on drills or on the flat ground. The land that had been ploughed in stubble in winter, is harrowed into a fine state in spring.

How are beans cultivated in rows on drills ?

The land is drilled, about thirty inches apart, the seed sown in the hollow of the drills, and covered up by reversing the drills, and the crop grows on the top of the drills.

How are beans cultivated in rows on the flat ground ?

The land is ploughed in the common way, and, while being ploughed, the seed is sown in every third furrow, and the crop grows on the flat ground.

How is the ground best manured for cultivating beans on drills ?

The manure is taken from a dunghill in carts to the drills. The two wheels of the cart, and the horse's feet, cover three drills. After removing the back-board of the cart, a man pulls the manure out of the cart, in motion, with a dung-hawk, in heaps, in the

centre hollow of the three drills. One woman, with a small common graip, then divides the heaps of manure into three, one heap in each drill; and three women follow, one in each drill, and spread the manure along the drills with a drill dung-graip. The seed-beans are then sown in the hollow of the drills, upon the spread manure, by a man pushing a bean-drill barrow before him. The plough then covers the manure, by splitting the drills, and finishes the operation.

Fig. 23.

A DRILL DUNG-GRAIP.

The usual mode is to hawk the dung out of the cart for five drills, and three or four women spread the dung in them as they best can. Where each woman is not confined to her own drill, the spreading of dung is apt to be ill done, and the negligent spreader cannot be detected.

How is the ground manured for cultivating the bean on flat ground?

The manure is taken from a dunghill, in carts, and hawked out in heaps upon single ridges, feered out to be ploughed. The manure is spread over the surface evenly by women, some with small common graips, others with drill dung-graips. The land is then ploughed in the ordinary way, the plough being followed by a woman with a drill dung-graip, to place some of the manure into every third furrow. The bean-drill barrow then sows the seed upon the dung in the third furrow, which the succeeding plough covers over with a furrow-slice, and finishes the operation. When three ploughs follow one another, the sowing proceeds rapidly by the drill-barrow following the third plough.

How are beans cultivated in broadcast?

In broadcast culture beans are sown by the hand upon the surface of the ground, and covered in with harrows.

What is the peculiar habit of the bean in its growth?

The bean requires abundance of air, and carries its grain from bottom to top of the stem, and therefore should be sown thin in the row, and the rows wide apart. When crowded, beans only mature their grain at the upper part of the stem.

Are pease cultivated in the same manner as beans?

Pease are commonly sown broadcast upon the flat ground; sown thick, and without manure. Pease are sown, in small proportion, with beans in rows. Pease are sown with beans, in broadcast, in about equal proportions.

Is there any difference in the treatment of the bean in drills, after sowing, from the flat mode of culture?

Drills in the making having one side a little higher than the other, the germ of the young bean would grow out of the side of the drill, were the drill-tops not lowered down with the harrows a short time after the seed has been sown. The flat mode of culture *does not require* such a harrowing.

TARES.

Of what use are tares?

Tares supply an excellent forage, or green food, for live-stock, in summer and autumn.

How are tares cultivated?

Tares are sown thick, broadcast, on land ploughed into ridges after being manured, and covered in with the harrow, and the surface made smooth with the roller, for the more easy mowing of the crop, when fit for use.

OATS.

Upon what portion of ground are oats cultivated?

Oats are sown on ground ploughed from grass, and at times upon land after turnips, instead of spring-wheat or barley.

What use is made of oats?

Oats supply oatmeal for farm-servants, and afford food for horses.

How are oats cultivated?

Oats are sown broadcast with the hand, or with the machine, or in rows with a drill-machine.

What circumstances determine the sowing of oats in broadcast or in rows?

In the neighbourhood of towns, where weeds abound, oats are sown in rows across the ridges, with a drill-machine, in order to allow cleaning of the ground by means of hand or horse-hoe.

What is the culture after the sowing of the seed?

After broadcast-sowing oats, the ground is harrowed along and across the ridges to cover the seed. When oats are sown in rows, the harrows are passed only along the rows to preserve the seeds in their places. The roller lastly smoothes the surface.

POTATOES.

How is the culture of potatoes commenced?

The land that had been ploughed in early winter in stubble, is ploughed across the ridges in spring.

What effect has cross-ploughing?

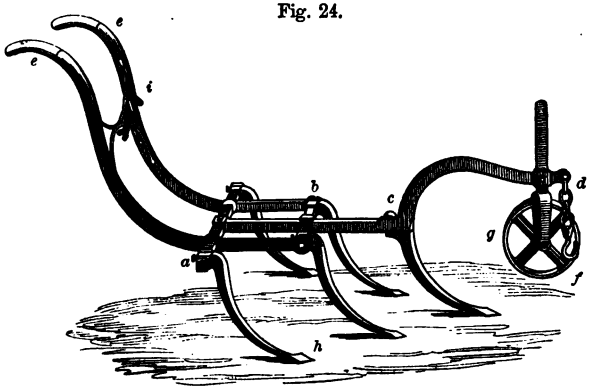
Cross-ploughing cuts the furrows across which had lain all winter in ridges. Cross-ploughing is executed in feerings of any breadth. Cross-ploughing is a powerful means of pulverising the soil, preparatory to the action of the harrow and roller.

When the soil has been pulverised enough on the surface, what is next done?

The weeds are gathered by hand, and carried away by carts. To preserve the pulverised surface uppermost, the grubber is used,

to stir the soil if necessary after the cross-ploughing. After the grubbing, the land is drilled up for the reception of the manure, and the manure is put into the drills in the manner described while treating of bean culture in drills at the bottom of page 25.

Fig. 24.



TENNANT'S GRUBBER.

a b is the iron framing of the grubber.
c d is the beam rising from the frame.
e e are the handles by which the man guides the grubber.
f is the hook by which the grubber is attached to the master-tree of the swing-trees.
g is the wheel which supports the fore part of the grubber, and regulates the depth to which it should go into the ground.
h is one of five tines which enter into the ground.
i is the hammer and nut-key for fixing the wheel *g* in its proper place.

Many forms of grubbers have been made, most of which require four horses to draw them. Tennant's grubber has hitherto been found to be the most efficient implement of its kind for two horses.

Fig. 25.

A POTATO CUT INTO SETS, EACH HAVING AT LEAST TWO EYES.

How are potatoes prepared for planting?

A potato is so cut with a sharp knife, that at least two eyes are left in each part for seed.

a a is the rose end of the potato, and is the best for seed.
b b, *c c* and *d d* are middle cuts, which, if the potato be large, may each be cut into two sets.
e e is the root end of the potato, which should not be used for seed, but given to live-stock.

Potato sets should always be large, and if planted whole, the root end should be cut off.

How are sets of potatoes planted?

As the manure is spread in the drills by women, other women plant the sets upon the manure at regular distances, from hand-baskets or aprons.

What is the culture succeeding the planting of the sets ?
The ploughs cover up the manure and sets together by splitting the drills into new ones.

Is potato land always manured in the spring ?
Not always. When land is clean, and in good condition, manure for potatoes is spread upon the stubble, and ploughed in with a deep furrow. Manuring in autumn expedites work in spring.

What sort of soil is best adapted for the potato ?
A light, naturally dry, rich soil is best adapted for the potato. The potato is a spring green-crop.

BARLEY.

What use is made of barley ?
Barley is chiefly made into malt, for the purpose of brewing malt-liquors, and of distilling spirits.

How is barley cultivated ?
Barley is commonly sown after turnips, whether eaten off the ground by sheep, or carried off the land. Barley is also sown after grass.

How is land treated for barley ?
The land for barley, after turnips, always receives two ploughings. The land is feered and ploughed into single or double ridges, and ploughed again the reverse way, or first cross-ploughed and then ploughed into single or double ridges.

Why should barley land always receive two ploughings ?
Because barley requires a fine deep loose mould.

What other means than the plough and the grubber may be used to make a loose mould for barley ?
Ribbing with the small plough (see page 5), makes a good seed-bed for barley, when the soil is clayey and raw underneath, late in the season.

How is barley sown ?
Barley is sown broadcast by hand or by machine. Barley is sown in rows with a drill-machine. Barley is sown in rows in ribs by hand.

What is the culture after the sowing of the seed ?
After sowing follows harrowing. In broadcast-sowing barley, the land receives harrowing along and across. After drilling or ribbing barley, the harrowing is only along the rows, to preserve the seeds in their places.

What follows the harrowing ?
Grass-seeds are then sown upon the land, and harrowed in with light harrows. The roller lastly makes the surface smooth.

GRASS-SEEDS.

What are grass-seeds ?

The seeds which produce grass, consist of those of true grasses, and of clovers.

Which grass-seeds are commonly in use ?

Of true grasses, only one kind is used, namely, rye-grass, of which there are two varieties—one, an annual, the other, a perennial. Of clovers, two kinds are used—red and white clover.

How are grass-seeds used ?

Rye-grass and clover seeds are first mixed, and then sown together.

In what proportions are rye-grass and clover seeds used ?

One bushel of rye-grass seed is sown on the acre. Clover seeds are proportioned to the nature of the soil, and the number of years the grass is to remain.

How are mixed grass-seeds sown ?

Grass-seeds are sown broadcast, with the broadcast sowing-machine, (fig. 20, page 23.)

When are grass-seeds sown ?

Grass-seeds are always sown in spring, along with the grain crops that follow green crops.

What is the culture after sowing grass-seeds ?

Grass-seeds are covered with light harrows, having short tines, in order that they may not be buried too deep in the soil. The roller lastly smoothes the surface.

TURNING OVER DUNGHILLS.

What is the manure, formed into dunghills in winter, done with in spring ?

The dunghills for manuring the potato and turnip land are turned over in spring, in order to ferment them a little, just before the manure is required for the crop. The manure fermenting under cover requires no turning over. The compressed manure in the courts and hammels requires turning over for fermentation, just before it is used.

How are dunghills turned over ?

A narrow trench is cut by a man, with the dung-spade, across the dunghill. The cutting is executed by holding the handle of the spade in both hands, and thrusting the point of its sharp double-edged blade with force into the dung, cutting the straw both right and left. The breadth of manure thus cut across is *shaken up with graips* by men or women, so as to make a clear

trench to the ground. Another breadth of the manure is then cut across with the dung-spade, and turned and shaken with the graips upon the ground of the cleared trench, to a greater height than the compressed manure. Trench after trench is thus made until the whole of the dunghill is turned over.

What immediate effect has turning over upon the manure ?

Turning over immediately excites fermentation in manure. Fermentation gives manure short texture and uniform quality. Heat in the atmosphere promotes fermentation in dunghills in a sensible degree. Hence the time for turning dunghills before using the dung should be regulated by the heat of the weather.

CALVING OF COWS.

In what state are live-stock in spring ?

Spring is the season when live-stock bring forth their young.

Which kind of live-stock produce their young earliest in spring ?

The cows are the first to produce their calves in spring.

What symptoms do cows exhibit of calving ?

The principal symptom is the filling of the udder with milk.

Do cows require assistance in calving ?

Cows calve the more easily with assistance.

How is the calf treated after birth ?

The calf is immediately taken away from the cow, and put into a crib of clean straw by itself. When the cow suckles its calf, the calf is still put into a crib by itself, and taken out of it at stated times each day, to be suckled.

How is the cow treated after calving ?

The cow receives a drink of lukewarm water and oatmeal after calving. Shortly after receiving the drink after calving, the milk is drawn from the udder of the cow.

How is milk drawn from the udder of the cow ?

Milk is drawn from the udder of the cow by stripping each teat between the finger and thumb, or by grasping each teat with the whole hand.

REARING OF CALVES.

How are calves reared ?

Calves are reared by hand, or by sucking their mothers.

How are calves reared by hand ?

The milk, warm from the cow, is put into a small wooden tub, having a long handle at one side to hold it by, and the mouth of the calf is led into the milk, by one hand of the person who feeds it.

How many times a-day should a calf be fed?

A young calf should have milk from the cow three times a-day, in small quantity at first, and increasing as the calf attains age.

Do calves on milk receive any other kind of food?

Hay and sliced turnips are placed before calves in their cribs.

How long are calves supported upon milk?

Calves have milk until they are three months old, after which the milk is lessened in quantity every day, and other sorts of food increased, until weaned from milk. Oilcake is good for calves.

When are calves put to grass?

Calves are put to grass whenever it is ready to receive them in mild weather.

How are calves reared when sucking their mothers?

Calves are allowed to suck their mothers from the birth. Before grass time calves are confined in cribs, and put to their mothers at stated times each day. When at grass, calves remain with their mothers constantly, until weaned.

Who takes charge of calves?

The dairymaid takes charge of calves.

LAMBING OF EWES.

What particular treatment do ewes in lamb receive previous to lambing?

Ewes about to lamb are put into a small field near the steading, in order that the shepherd may the more easily observe symptoms of lambing as they appear.

Do ewes require assistance in lambing?

Leicester ewes require assistance in lambing, but the more hardy races do not.

What treatment does the ewe receive on lambing?

The ewe remains in the paddock for some days after lambing, and receives nourishing food, such as cabbages, turnips, oilcake, and corn, if weak, until it is seen that she has plenty of milk, and the lambs are able to suck and follow her, when both are put on new grass.

Are ewes subject to any complaint after lambing?

Ewes are at times seized with inflammation after lambing, *of which they not* seldom die.

In case of a ewe dying, what is done with her lamb or lambs?

Lambs that have lost their mothers are put to ewes that have either lost their lambs, or had single lambs.

When a ewe dies, and there is no other ewe to take her lamb, what is done with the orphan lamb?

The orphan lamb is brought up by hand by the dairymaid upon warm cow's milk.

FARROWING OF SOWS.

When do sows bring forth their young?

Not earlier than spring, as winter is too cold a season for young pigs.

How are sows treated prior to the period of farrowing?

Sows are allowed to go at large until symptoms of farrowing appear upon them, when they are put into a roomy sty, under cover, and easy of access.

Do sows require assistance in farrowing?

No: sows bring forth their young easily. Sows, being apt to become sick after farrowing, should be attended to at that period. The litter of sows should be scanty and short at farrowing, in case they lie down upon and smother the young pigs.

Should sows receive food soon after farrowing?

Food is given to sows whenever they get on foot after farrowing.

What sort of food is best for sows after farrowing?

A gruel of oat or barley meal, with warm water, is the best drink for sows after farrowing.

How old are pigs when weaned from the sow?

Pigs remain with the sow until two months old. While suckling pigs, sows should receive the most nourishing food.

HATCHING OF POULTRY.

Which sort of poultry first lay their eggs in spring?

Ducks are the earliest layers of eggs—then fowls, then geese, and lastly turkeys.

What is the natural habit of poultry when laying their eggs?

All kinds of poultry seek out a place to make their nest, lay a certain number of eggs in it, and then desire to sit upon them, to produce young.

Are poultry indulged in this natural desire to produce young?

Not all kinds of poultry. Eggs are taken away from most hens and ducks as soon as laid. When eggs are taken away from hens and ducks, they continue to lay a considerable number of

eggs beyond that required for hatching. Geese and turkeys are allowed to hatch the eggs they lay.

How are eggs treated on being gathered?

If not disposed of at once, eggs are placed singly upon a wooden shelf, and turned over on the opposite side every day.

Are hatching-nests made for poultry?

Hatching-nests for poultry are made upon the floor of the hen-house, to enable young birds to leave their nests. Poultry are separated from each other while hatching their eggs.

How are chicks of the common fowl treated when just hatched?

Chicks have crumbs of bread and oatmeal to eat, and water in a flat dish to drink, for a time; then rice, groats, pearl-barley, until they are able to eat the food given to the hen. Hens have boiled potatoes, oatmeal-porridge to eat, and water to drink.

How long do chickens go with the hen?

Chickens go six weeks with the hen, when they shift for themselves.

How are young turkeys treated?

Young poults have hard-boiled egg—the yolk and white being minced very small—to eat, and milk to drink, for the first fortnight. When a fortnight old, young poults have small pieces of hard oatmeal-porridge, along with hard-boiled egg, to eat, and milk to drink. When the feathers of the tail and wings begin to sprout, the hard-boiled egg is withdrawn, and the hard oatmeal-porridge continued, with bits of fresh minced-meat. The turkey-hen has boiled potatoes, oatmeal-porridge, and corn to eat, and water to drink.

How are goslings treated?

Goslings are fed on grass, in a warm sheltered situation. Geese eat grass with the goslings.

How are ducklings treated?

Ducklings are kept from swimming in water for some days. Ducklings have soft food, such as oatmeal-porridge, boiled potatoes, bread steeped in water, barley-meal brose, to eat, and water to drink. This food is given to ducklings after they take to the water. The duck receives the same food.

Are young poultry easily affected by the weather?

All young poultry are taken under cover whenever a shower of rain falls. Until feathers cover their body, rain is injurious to young poultry. Goslings are apt to fall on their back, and soon die if not set again on their feet. When ducklings are allowed to swim too soon, they over-exert themselves, and becoming benumbed, die.

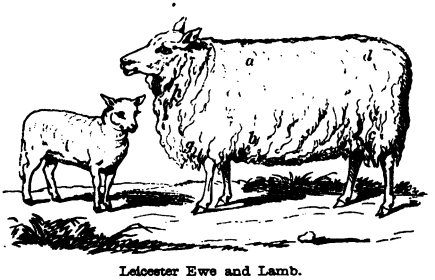
What is the great principle to be attended to in the rearing of young poultry?

Attention to warmth and dryness, with a regular supply of

good food daily, for at least the first fortnight of their existence, are essentially requisite in the rearing of poultry. Care will be crowned with success, while neglect will entail disappointment and loss. New-hatched poultry should be put into a warm chamber every night for at least a fortnight.

Who takes charge of poultry?

The dairymaid or domestic servant takes charge of poultry. In a large establishment of poultry a person is specially appointed to take charge of them.



Leicester Ewe and Lamb.

Head long and narrow; fine muzzle; prominent eyes; long, broad, thin ears. Bone of the leg small, firm, and broad. The body well covered with wool, and rectangular. The counter *g* full; shoulder well filled up at *a*; rib at *f* round; loin at *e* filled up; rump *d* level with the back.

The wool comes forward behind the ears at *i*, and towards the cheeks at *h*; the belly is well covered with wool at *b*, as also the flank at *c*.

SUMMER.

What is the nature of farm culture in summer?

Farm culture in summer consists of the cultivation of plants sown in spring, in the sowing of green crops, and in promoting the progressive growth of live-stock.

What is the general treatment of growing plants in summer?

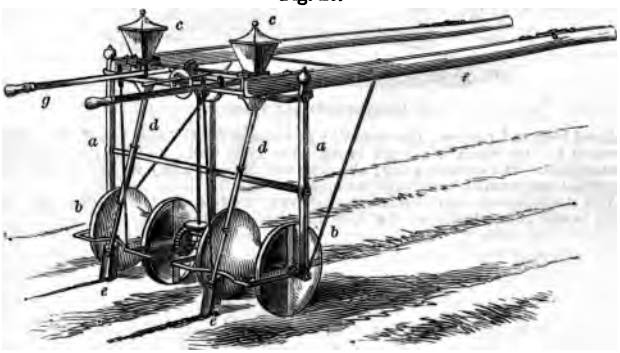
While grain-crops are kept free of weeds in summer, green-crops are sown and cultivated for present and future consumption. Summer green-crops are—turnips, mangold-wurzel, hay, clover, Italian rye-grass, rape.

TURNIP-SOWING.

How is the turnip cultivated?

The stubble land is ploughed in winter; it is cross-ploughed in spring; and in summer it is cleaned and pulverised as finely as possible before the turnip-seed is sown. After cleaning and pulverisation, the land is drilled up and manured as described for beans at p. 25.

Fig. 26.



A TURNIP SOWING-MACHINE.

a a is the framework of the machine.
b b are two cast-iron rollers, so formed as to lap over two of the drills, and they revolve on an axle.
c c are two canisters for seed.
d d are the spouts down which the seed is conveyed into the ruts made in the top of the drills by the coulters *e e*.
f are shafts for the horse.
g are handles by which a man guides the machine.

A small lever between the handles *g* puts the gearing out of and into action.

There are great varieties of form of turnip sowing-machines. This is one of the *simplest and least costly.*

How is turnip-seed sown?

Turnip-seed is sown by means of a turnip sowing-machine.

With what manure are turnips raised?

Turnips are commonly raised with farmyard manure, assisted with guano. Turnips are raised with guano alone. Turnips are raised with bone-dust alone.

When guano is used with farmyard manure, how is it applied to the land?

Guano is always sown by hand, no machine having yet been invented for distributing it. Guano is sown upon farmyard manure after it has been spread along the drills. The plough, which splits the drills, covers both the manure and guano.

How is guano used alone for turnips?

Guano is sown upon the land before the drills are made up, which, on being made up, brings the guano into their centre.

How is bone-dust manure used for turnips?

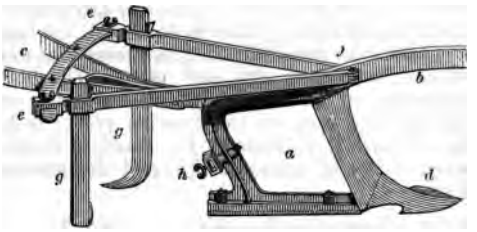
Bone-dust is deposited in the drill, along with the seed, by means of a bone-dust sowing-machine.

A bone-dust sowing-machine is just the common turnip sowing-machine mounted with two hoppers for the bone-dust.

May bone-dust and guano be used together in raising turnips?

Guano and bone-dust are advantageously used together—the guano supplying ammonia; the bone-dust phosphates.

Fig. 27.



A SCUFFLER FOR TURNIP AND POTATO CULTURE.

a is a body similar to that of the double mould-board plough, fig. 4.

b is the beam, cut short.

c are the stilts, cut short.

d is a double-feathered share, to cut a considerable width under the surface.

e f and *e f* are wing-bars, which expand and contract at the hinges *f*. The wing-bars *e f* traverse upon a quadrant-bar between *e* and *e*, and are made fast in their places with pinching-screws.

g g are two coulters borne by the wing-bars *e f*, whose lower ends are bent inwards, and thinned off to a knife-edge, to cut the sides of the drills on each side of the double-feathered share *d*.

There are many forms of scuffilers besides this one.

Drill-harrows are used for the same work as scuffilers, but are not so efficient.

This form of scuffler can be converted into a double-mould-board plough by removing the wing-bars *e f*, and the coulters *g g*, and putting on mould-boards at *a*, which are kept in their places by slips which pass through a staple, and are fastened in it with the pinching-screw *h*.

What is the treatment of the young turnip plant?

After the young turnip-plants have brairded and produced four

leaves, the ground between the rows of the plants is thoroughly moved with the drill-harrow or scuffler, to remove the growing weeds, and to pare away the soil on either side of the upper part of the drills, in order to facilitate the singling of the turnip plants.

Fig. 28.

SINGLING TURNIP-PLANTS.

a b is one row of turnip plants.
c d is a second row of the same, both to be singled by the same woman.
e f is a third row of turnip plants.
g h is a fourth row of the same, both to be singled by the same woman.
i k is a fifth row of turnip plants.
l m is a sixth row of the same, both to be singled by the same woman.
n o is the last row singled in the last division of the drills occupied by the women.
l m, *g h*, and *c d* are the rows first singled; then *i k*, *e f*, and *a b* are singled.

Men and boys are usually employed in England to single and hoe turnips. Women are employed in Scotland.

How is the singling of turnip plants executed?

Singling of turnip plants is done with the hand-hoe by women, who each take two drills, to give themselves room to use the hoe without interfering with each other. The hoe removes all the plants against the length of its blade, leaving one plant growing. The distance between the growing plants is determined by the kind of turnip cultivated,—the smallest distance being left between plants of white turnips, and the greatest between those of swedes.

What is done after the turnips are singled?

After the singling, the scuffler is again employed to remove the weeds between the rows of the turnip plants. The ground around each plant is then moved with the hand-hoe, and weeds destroyed, and any plants found double are singled by hand. When land is naturally dry, hoeing finishes the culture of the turnip. When the soil is strong, the double-mould-board plough lays up the earth on each side of the drills towards the plants, leaving the bottom of the drills hollow, for water to run off.

What is the soil best suited to the turnip?

A deep loamy soil, resting upon a naturally dry subsoil, is the *best soil for the turnip.*

What is the character of the substance of the bulbs of the white globe, the swede, and the yellow bullock turnips?

The swede is the heaviest in specific gravity, is of buff colour, and the larger the bulb it contains the more nutriment. The white globe turnip is open in texture and juicy, is of white colour, and when large becomes hollow in the heart. The yellow bullock turnip bears a medium character between the swede and the white globe, as to nutriment and specific gravity, and is of orange colour.

MANGOLD-WURZEL.

What is the nature of mangold-wurzel?

Mangold-wurzel is a species of beet, well known in Germany.

How is mangold-wurzel cultivated?

Mangold-wurzel is cultivated like the turnip.

Does the cultivation of mangold-wurzel differ at all from that of the turnip?

The seed of mangold-wurzel having a rough covering, cannot be sown by the turnip sowing-machine, and is sown by hand.

HAY.

What crop is made into hay?

The grass produced from the grass-seeds, sown among the grain-crops of the former year (page 30), is made into hay in summer.

Are no other plants but rye-grass and clover made into hay?

Old meadow-grass is made into hay.

Most of the hay used in England and Ireland is made of old meadow-grass. But little of the hay used in Scotland is made of old meadow-grass.

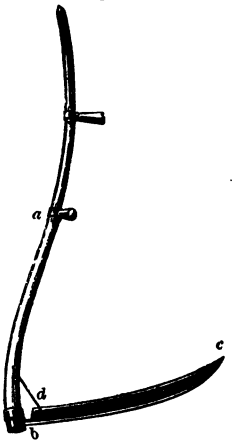
What is the nature of hay?

Hay is rye-grass, clovers, and old meadow-grasses deprived of their natural moisture by the heat of the atmosphere, when mown in the prime of their growth.

How is grass mown for hay?

Grass is mown for hay with a scythe.

Fig. 29.



THE COMMON SCYTHE.

a is the sned.
b c is the blade.
d is the grass-nail, which acts as a stay for resisting the strain upon the blade *b c*.

In setting the blade of a scythe, the handle from *a* to *b*, the blade *b c*, and the distance from the point *c* to the handle *a*, should form an equilateral triangle.

How is grass treated after being mown?

Grass is tedded or shaken up to be dried. Grass is best and most quickly tedded by a hay tedding-machine. Each day's *mowing* is tedded in succession.

How is tedded grass treated?

Tedded grass, after exposure to the air, is put into small heaps, or cocks, by hand or with small forks. The ground is cleared with a hand-rake.

Which is the best rake for hay-making?

The horse hay-rake acts most quickly. The hand-rake is most commonly used.

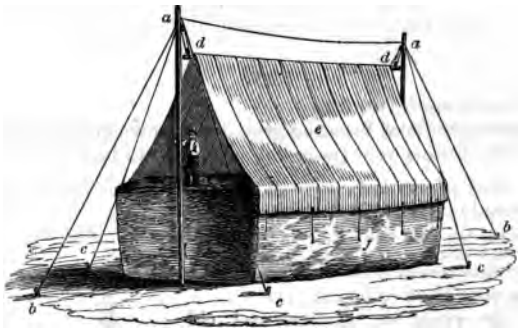
What is done with the small cocks of grass?

In fine weather the cocks are spread upon the ridge on which they stand, to dry the grass still more. The grass is then put into larger cocks. The ground is cleared with the hand-rake.

What is done with the larger cocks?

If necessary, the larger cocks are spread out to the air. The grass being changed into hay, is carried in carts to the stack.

Fig. 30.



RICK-CLOTH FOR A HAY-STACK.

a a are two poles set up in distance of the length of a rick-cloth.
b c are guy-ropes supporting the poles.
d d is a spar hoisted up and lowered down by means of block and tackle.
e is the rick-cloth suspended over the spar *d*.
f are reef-points for fastening the rick-cloth to the stack.

The hay is brought in small quantity every day from the field, in a cart, and spread thinly over the stack under the rick-cloth, where it dries in the draught of air. When the stack is finished the rick-cloth is removed, and the stack covered with straw, held down with straw ropes.

How is hay stacked?

Hay is best stacked under cover of a rick-cloth, which protects the stack from rain.

Does a hay-stack, protected by a rick-cloth, incur any danger?

Yes. Hay incurs the risk of heating by fermentation, when the *moisture has not been* sufficiently dried out of the grass.

Does heating injure hay?

A little heating improves the taste of hay. Much heating gives hay a bitter taste, and moulds and rots it.

Is the hay-stack finished under the rick-cloth?

No. After the removal of the rick-cloth, the stack is covered with straw, kept down with straw ropes, to protect it from the weather.

Is the mode described above the common mode of making hay?

It is the common mode of making hay in England and Ireland, but not in Scotland. The hay tedding-machine, the horse hay-rake, and the rick-cloth, are not yet much used in Scotland. In England and Ireland hay is much better made than in Scotland.

How is hay used from the stack?

Hay is cut in narrow breadths across the stack by means of a long knife having a cross handle, and is carried into the hay-house for use.

RAPE, ITALIAN RYE-GRASS, RED CLOVER.

What is the nature of the rape plant?

The rape plant is of the cabbage tribe, and is cultivated for its leaves.

How is rape cultivated?

The best cultivation for rape is precisely that of the turnip, in drills. Rape is also sown broadcast on the flat ground.

For what kind of live-stock is rape cultivated?

Rape is much relished by sheep and cows. Sheep eat rape on the ground. Cows receive rape in the byre. Rape is valuable food for ewes before being put to the tup in autumn.

How is Italian rye-grass best cultivated?

Italian rye-grass, growing rapidly and tall, is best cultivated broadcast by itself, with manure, as a forage plant. Italian rye-grass affords several cuttings in a season. Italian rye-grass is much relished by live-stock.

Is red clover a good forage-plant?

Red clover is an excellent forage-plant when sown by itself, as in England and Ireland. Red clover makes the best hay for ewes in winter, when the ground is covered with snow.

How are forage plants best secured?

Tares are best cut with the sickle, being apt to entangle the scythe. Rape is too strong for the scythe, and is cut with the sickle. Rye-grasses and clovers are best mown with the scythe.

WEEDING GRAIN AND GREEN CROPS.

What is the culture of grain-crops in summer?

The removal of weeds from grain-crops is their chief cultivation in summer.

How are weeds removed from grain-crops?

From wheat, barley, and oats, in drills and ribs, the hand-hoe and horse-hoe remove the weeds.

How are weeds removed from grain-crops sown broadcast?

Weeds are removed from broadcast grain-crops by means of a weed-hook.

Fig. 31.

A WEED-HOOK.

How is a weed-hook used?

Two women walking among the growing corn, when knee-deep, along every ridge, cut every weed close to the ground with a weed-hook. Weeds chiefly found among growing corn are thistles and docks. Popple is found amongst wheat, and is pulled up by the roots.

Of what use is weeding to grain crops?

Weeding removes the seeds of weeds that would otherwise mix with grain in the sample.

Are weeds removed from green crops in summer?

In summer the scuffler removes weeds from potatoes, turnips, mangold-wurzel, rape. The hand-hoe best destroys thistles, ragweed, nettles, from pasture.

Is grass for hay ever weeded?

Grass for hay is weeded by means of the weed-hook.

PASTURING AND SOILING LIVE-STOCK.

How are cattle, sheep, and horses treated in summer?

When winter food—turnips, straw, and hay—becomes exhausted, live-stock are put to pasture, or are soiled at the steading on forage plants.

What is pasturing on grass?

Pasturing on grass is giving liberty to animals to eat grass as it grows.

What grass is pastured?

Permanent and sown grasses are pastured. The older sown grasses are pastured. The younger sown grasses are mown for *soiling or for hay.*

What class of cattle are pastured?

Cows, calves, and young cattle, are pastured.

Do cattle on pasture remain out day and night?

Until the nights become warm, cows and calves are brought into the house at night. Young cattle remain out all night on pasture.

What pastures do sheep occupy?

Ewes and lambs pasture young grass. Fattening sheep pasture the best old grass.

Are horses pastured?

Young horses remain out all night at pasture. Work-horses are pastured as soon as turnip-sowing or bare-fallowing is brought to a close. Except for a few weeks of warm nights, work-horses are kept in the stable or hammels at night.

What is soiling live-stock?

Soiling consists in giving green forage-plants to live-stock at the steading.

What class of live-stock is soiled?

Work-horses are soiled in the stable or hammels. In cold or wet weather, cows are soiled in the byre.

Is abundance of forage plants and straw secured every summer?

No. In dry-land districts straw is always scanty. In most seasons only one good mowing of clover is obtained. Tares and rape can only be mown once.

Of what use is the grass after hay has been carried from the field?

Aftermath or eddish is pastured by young cattle, calves, cows, and fattening sheep.

Is aftermath valuable grass?

Aftermath is valuable in producing good butter and cheese.

Is water essential to live-stock on pasture?

Water is an absolute necessary for live-stock on pasture, or when soiled.

MARES FOALING.

What is the treatment of mares about the time of producing their young?

A mare is worked till symptoms of foaling appear, when she is put by herself into a loose-box or outhouse.

Do mares require assistance in foaling?

Mares foal very easily, without assistance.

Is the foal in danger when being foaled?

The foal may be smothered in the placenta of the mare when being foaled. In the exertion to rise to its feet the foal may exhaust itself to death. Hence a mare should be waited upon at foaling.

What is the treatment of the foal immediately after birth?

The foal's nose should be freed of any obstruction to breathing. After a little time the foal is assisted to its feet, and to the teat of the mare.

How is the mare treated after foaling?

After receiving nourishing food for some hours—such as warm mashes of boiled carrots and barley, and drinks of lukewarm water and oatmeal, the mare is put to grass, with her foal, for the season.

Are mares worked while suckling their foals?

Some farmers work mares while suckling their foals, in which case both the mare and foal ought to have corn.

WASHING AND SHEARING SHEEP.

How is the fleece on the sheep treated?

Sheep are washed in water, to make their fleece clean before being shorn.

Are sheep prepared for being washed?

Sheep are enclosed, by net or hurdles, on one side of a pool made in a rivulet. Until all have been washed, sheep are confined in a similar manner on the other side of the pool.

Fig. 32.

SHEEP-WASHING.

a is the washing-pool, formed by damming back the water of a rivulet to the requisite depth.

b are the sheep enclosed on one side of the pool, preparatory to being washed.

c is the first man who washes, and who hands the sheep to the second man in the middle of the pool, and he in his turn hands it to the third man, who is the shepherd.

d is the enclosure for the washed sheep on the other side of the pool.

Both banks of the pool ought to be grassy, to keep the fleece of the sheep clean from earthy matter.

How are sheep washed in a pool?

One man seizes a sheep within the enclosure, and hands it to

another man standing to the haunches in the pool. This man turns the sheep on its back in the water, keeping its head above it, and pushes it to and from him through the water, after which he hands it to another man standing in the water, who, operating in a similar manner, hands it to the shepherd, who, on particularly examining whether the fleece is sufficiently clean, allows the sheep to swim to the enclosure on the opposite side of the pool.

Are ewes and lambs washed together?

Lambs are not washed at all, and are confined in the steading until the ewes have been washed.

How are sheep treated after being washed?

Washed sheep are put into a clean grass-field until ready to be shorn.

What is the state of a fleece ready to be shorn?

A fleece is ready to be shorn when its natural grease, or yolk, completely pervades the staple of the wool, and the fleece is dry.

Of what use is yolk to the wool?

Yolk serves to keep the wool smooth and supple, in which state it is best suited to the manufacturer.

By what means is the fleece shorn from the sheep?

The fleece is shorn from sheep by hand, with shears.

How is shearing of the fleece performed?

Sheep to be shorn are put in dry with the wool under cover. A canvass is spread upon the ground under cover. The shearer seizes a sheep, and setting it against himself on its rump, removes the wool about the head, neck, and belly. Turning the sheep on its right side, the shearer clips the wool from the belly to the back-bone of the left side. Turning the sheep upon its left side, the shearer clips the wool from the back-bone to the belly of the right side. On the shearing being finished, the sheep is allowed to join its companions under cover.

What is done with the shorn fleece?

A woman rolls up the fleece, with its outside in, upon a board, and carries it to the wool-room.

Are all kinds of sheep washed and shorn in the manner described?

Mountain sheep are washed by being swum through a pool. The fleece of mountain sheep is shorn by the shearer clipping the wool in any direction he may choose to use the shears, generally along, instead of round the body of the sheep.

How is wool disposed of?

Wool is sold to a wool-dealer. A wool-dealer sends his people with pack-sheets to pack the fleeces into, and take them away. Some farmers pack the fleeces into pack-sheets of their own, and send them to a wool-dealer.

Fig. 33.

WOOL-PACKING.

No. 1 is a wool-pack completed; No. 2 is a wool-pack being filled; *a* are fleeces which have been weighed, and are being conveyed by the girl to be packed; *b* is the store of fleeces to be weighed in the balance.

How are fleeces packed in a pack-sheet?

Fleeces are first weighed on scales. The pack-sheet is suspended from the roof with ropes from two of its corners, and with its open side uppermost. Two men go into the pack-sheet, and, on receiving the fleeces, place them in regular order in the sheet, and tramp them down firmly with their feet until the sheet is full, when its open side is sewed close with pack-thread and needle.

On weaning lambs from ewes, what is done with both?

Ewes are milked by hand for a few times in the course of a week or two, to allow the milk to dry up. Lambs are placed at a distance from the ewes until they cease to bleat.

DISEASES OF GRAIN AND GREEN CROPS.

Are grain and green crops subject to any disease?

All the cultivated crops are subject to disease.

What diseases attack wheat?

Wheat is subject to the attack of the wheat-fly, whose young eat the unformed grain in the ear. Wheat is subject to smut, a fungus which turns grains into balls of black powder. Leaves of wheat are covered by rust, another fungus, which is like a red-coloured dust.

What diseases attack barley?

Barley is subject to ergot, which distorts the shape of the

grains. Barley is attacked by an insect, which lives upon the young grain in the ear.

What diseases attack oats?

Oats are subject to segging, which stints the leaves, and hardens the roots. Oats are attacked by a fungus, which renders the ears black and devoid of grains.

What diseases attack rye?

Rye is attacked by the well-known ergot—used in medicine.

What diseases attack beans?

Beans are attacked by a plant-louse, which devours the leaves.

Is the turnip subject to any disease?

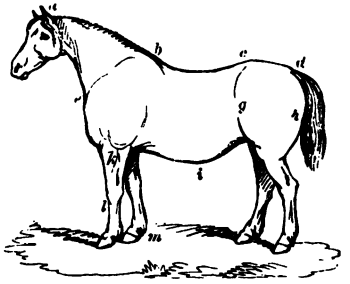
A flea-beetle consumes the leaves of the young turnip-plant. In dry weather, leaves of turnips are subject to mildew. Finger-and-toe distorts the bulbs of turnips. Anbury is a warty sore on the bulbs of turnips, which causes an ichorous discharge.

Is the potato subject to any disease?

Curl attacks the potato. Potato-failure blackens the leaves and blotches the tubers of the potato-plant.

What remedies have been suggested for diseases in crops?

Pickling prevents smut in wheat. Lime checks the violence of finger-and-toe and anbury in the turnip. Rain removes flea-beetle and mildew from the leaves of turnip-plants. No remedy has yet been found against the plant-louse on the bean, the ergot in rye and barley, the black ears in oats, and the failure in the potato.



Draught Mare.

From *a* to *b* a fine crest; short back *b c*; rounded rump *c d*; sloping shoulder *b e*; long quarter *g h*; strong arm *k*; straight front and back limbs *l* and *m*. The hollow in the back and belly between *b c* and *i* is owing to foal-bearing.

Besides roundness and length of rib, a brood mare should be wide across the hook-bones and the pelvis, to afford room for the growth and egress of the foal. This mare obtained the first prize at all the agricultural shows near Edinburgh.

AUTUMN.

What is the nature of farm culture in autumn?

In autumn, butter and cheese are made, grain-crops reaped, live-stock disposed of, and purchased for the ensuing year.

MAKING BUTTER AND CHEESE.

What is the accommodation required for making butter and cheese?

A cool, shaded, dry room in the farmhouse keeps milk sweet, and cheese in a proper state until fit for market.

What are the utensils for making butter?

Utensils for butter-making are, a sieve for straining the milk, milk-dishes, a churn for making the butter, a cream-skimmer, a cream-jar, and a small tub for washing the butter in.

What sort of sieve strains milk?

A hollow wooden basin, with pierced zinc in the bottom, makes a good sieve for straining milk.

Why is milk strained through a sieve?

Milk is poured through a sieve, on coming from the cow, to take out hairs that may have been drawn from the cow in the act of milking, or any other impurities.

Fig. 34.

A MILK-DISH OF WEDGWOOD WARE.

Of what construction are milk-dishes?

Milk-dishes are made of various forms, and of different materials. Milk-dishes are round, oval, dished, and shallow, in form. Milk-dishes are made of common stoneware, of china, glass, wood, zinc, slate, and marble. Whatever the material of milk-dishes, they are made broad and shallow, to allow the cream to come quickly to the top of the milk. Milk-dishes are best of *Wedgwood ware*, because strong, and easily kept clean.

Of what use is a cream-skimmer?

A cream-skimmer, being a thin-edged hollow dish of china or tin, takes the cream off milk easily and effectually.

Of what use is a cream-jar?

A cream-jar is generally made of glazed china-ware, and its use is to hold cream until churned into butter.

Why is cream skimmed from milk?

Cream is separated from milk to have it made into butter.

Is not butter obtained from milk itself?

Butter is made from milk, as also from cream.

Why is not all butter made from milk?

Butter is not all made from milk, because it is most easily made by hand from cream. Power is required to make butter from milk.

What is the best construction of churn to make butter in?

The old plunge-churn, and the box-churn, are both simple in construction and efficient in use.

Of what form is the plunge-churn?

A plunge-churn is an upright cylinder of wood, with a flat plunger, perforated with holes, to fit its interior.

a is the body of the churn.
b is the shaft of the plunger, which is not seen in the figure.
c is the cover of the churn, having a raised cup upon it, through which the shaft of the plunger works.

The motion for working a plunge-churn is vertical. It may be moved by hand or power.

The box-churn contains fans, which have a rotatory motion. There are a great many forms of churns, but they all involve these two principles of motion.

Fig. 35.

A PLUNGE-CHURN.

Of what form is the box-churn?

A box-churn consists of a bevelled oblong box, in which revolves an agitator with cross-bars, upon a spindle passing through the box, worked by a winch handle.

Is sweet cream or milk churned into butter?

No. Both cream and milk must be kept till they become sour to make good butter.

Is cream or milk churned cold or warm?

The best temperature for milk or cream to be churned into good butter is 56° Fahrenheit.

What is done with new-churned butter?

New-churned butter is taken from the churn and washed clean of the butter-milk, which is sour, in cold water, and made into rolls, or ornamental prints, for use as fresh butter.

Is all the butter eaten fresh?

Butter eaten in winter is in a salted state.

Fresh butter is eaten in Scotland in summer. It is very rare to meet with fresh butter in England.

How is butter salted?

On butter being washed clean in cold water, a certain proportion of salt is strewed upon a given quantity of it in a small tub, and it is worked by hand until the salt is equally diffused through it. Salted butter is packed firmly in stoneware jars or wooden kits, for use in winter.

Of what use is milk deprived of its cream?

Skim-milk is used for domestic purposes. Skim-milk is not so nutritious as sweet-milk.

Of what use is butter-milk?

Butter-milk is used for domestic purposes, or given to pigs.

From what is cheese made?

Cheese is made from sweet-milk, and from skim-milk. Both sweet-milk and skim-milk cheese is made in the same manner.

What are the utensils required in cheese-making?

Utensils used in cheese-making are a large tub, a curd-cutter, a drainer, cheese-vats, cheese-press, and boiler.

Of what construction is a curd-cutter?

A curd-cutter consists of an oval or round hoop of iron, divided along the middle by a straight slip of iron. The iron hoop has an iron stem, furnished at top with a wooden cross-handle.

What is a cheese-drainer, and its use?

A cheese-drainer is made of two small bars of wood connected with two cross-bars of wood. A cheese-drainer lies across the mouth of a tub to support the curd while the whey is being squeezed out of it.

Of what form is a cheese-vat or chessart?

A cheese-vat consists of a strong tub of wood hooped with iron, of a form determined by the form of the cheese to be made.

Of what construction is a cheese-press?

The best form of cheese-press is of combined levers, which have the advantage over the common stone cheese-press of continuing their pressure upon the cheese as its shrinks into less bulk in the cheese-vat.

Of what form is a boiler?

A boiler is of cast-iron, globular, and built over a furnace provided with a damper.

How is cheese made?

Milk is put into a large tub or tubs, part of which is heated in

the boiler, to make all the milk as warm as new milk. Rennet is put into the warm milk to convert it into curd.

What is rennet?

Rennet is made of the stomach of a calf or pig, salted and dried.

What is curd?

Curd is the coagulated part of milk, having a white colour.

What is done with curd?

Curd is cut into pieces in a tub with the curd-cutter. As curd is cut, whey flows out.

What is whey?

Whey is the watery part of milk, and is of yellow colour.

What is done with curd after its separation from whey?

Whey is removed from curd with a hollow dish, pressed firmly by the hands. The comparatively dry curd is then put into a cloth of open texture, and placed upon the drainer on a tub, and as much whey is pressed out as the strength of arms or mechanical means can effect. The curd becomes dry, of a pure white colour, and firm in texture.

What is done with dry curd?

Dry curd is cut small with a knife, or curd-breaker, and then salted.

A curd-breaker consists of two cylinders, of wood or iron, armed with pegs, revolving in opposite motions, at the bottom of a hopper. The cylinders take in the curd from the hopper, while the pegs tear it into very small pieces.

What is done with salted curd?

Salted curd is wrapped in a cloth and put into a cheese-vat, under a cover of wood, and placed upon the sill-plate of the cheese-press, which, with great pressure, forces all the whey out of it. By repeated pressing and changing of cheese-cloths, curd is hardened into cheese.

What is done with cheese?

Cheese, on being taken from the vat, and out of its cloth, is placed upon a clean shelf of wood in a cool, airy cheese-room. Cheese is turned every day, until ready for market.

What is done with whey?

Whey is given to pigs to drink.

DISPOSAL AND PROPERTIES OF LIVE-STOCK.

When are cattle and sheep, fattened on turnips in winter and spring, disposed of?

Cattle and sheep fattened on turnips in winter and spring, are

disposed of whenever the turnips are consumed, which at latest is the beginning of summer.

When are cattle and sheep, fattened on grass in summer and autumn, disposed of?

Cattle and sheep, whether bought in or bred on the farm, fattened on grass in summer and autumn, are disposed of at the end of autumn.

Are young cattle and young sheep on grass disposed of?

Young cattle from grass are fattened on turnips in winter. Young sheep have turnips in winter. Lambs, when reared for fat lambs, are sold in summer as soon as they are fat. Lambs, when sold lean, are sold as soon as they are weaned.

How are cattle and sheep, to be bred from, selected?

Individual animals, possessing properties most desirable in live-stock, are kept, the others drafted.

What are the most desirable properties in live-stock for breeding?

Desirable properties in live-stock are uncrossed blood, beauty of symmetry, and disposition towards particular good properties, as fatness or milk.

What is uncrossed blood?

Uncrossed blood is freedom from intermixture with the blood of other breeds.

What is a breed in live-stock?

A breed in live-stock is a family of animals possessing similar properties distinct from other families of the same race.

In what does symmetry consist in live-stock?

Symmetry in live-stock is a balanced proportion between different parts of the body of the same animal.

What are the balanced proportions which constitute symmetry?

A balanced proportion in the body of an animal consists in having the fore and hind quarters the same in length, breadth, thickness, and weight.

What constitutes beautiful symmetry in animals?

Beautiful symmetry in animals is indicated by fineness in prominent points of the body, such as—head small; features of the face distinctly marked; eyes large, full, and clear; ears erect, large, and thin; muzzle tapering; back straight; ribs round; tail fine and perpendicular; skin loose and soft; limbs short, fine-boned, and flat; joints large.

What is a disposition to fatten, or yield milk, in live-stock?

When cattle or sheep put on a larger quantity of flesh and fat, or give a larger quantity of milk, with the smallest quantity of food, they evince the greatest disposition to fatten, or to give *milk.*

Are properties of blood, symmetry, beauty, disposition to fatten, to give milk, reproducable in the young?

Blood, symmetry, beauty, disposition to fatten, to yield milk, are hereditary, as well as colour, temper, and tendency to diseases.

How are drafted animals distinguished from others?

Drafted animals are distinguished by marks from others.

Are not all live-stock marked?

Yes; marks consist of holes, slits, or notches in the ears, or of letters stamped upon the sides of animals.

Holes, slits, and notches in the ears are made with a punching-nipper and knife. Brands are made on the sides with letters dipped in tar, and burned upon the horns with a stamp.

Of what use are marks upon cattle and sheep?

Marks identify animals when they go astray. Marks indicate animals possessing particular properties and pedigree.

BARE-FALLOWING.

Must all the land of a farm bear a crop every year?

Not of necessity; but because very strong clay-soil is not well adapted to carry green crops; because sufficient manure for all the soil may have to be found elsewhere than on the farm; and because part of the soil, when comparatively foul of weeds, requires bare-fallowing to clean it thoroughly.

How is bare-fallowing conducted?

Fallowing always succeeds a grain crop. The stubble is ploughed in winter; cross-ploughed in spring; harrowed, weeds removed, grubbed, manured in summer; ploughed, sown with wheat in autumn, to be reaped the following year.

Is other manure than farmyard used on bare-fallow?

Lime is used at times. Lime is spread upon the feered ridges, and harrowed in, or put in heaps upon them, slaked, and harrowed in, before the manure is laid on and spread, and the seed-furrow ploughed.

Does fallow wheat-land receive any peculiar finishing?

Open furrows between the ridges are water-furrowed. Channels are cut with the spade across small hollows in the ridges, and across the lower head-ridges, to allow rain to run more easily into the ditches in winter.

THE HARVEST.

What is regarded the period of harvest?

The great operations of reaping and securing grain-crops constitute the harvest.

How is the reaping of grain-crops conducted?

Grain-crops are reaped by hand with the sickle or scythe, or by reaping-machines.

How is reaping effected with the sickle?

Reaping with the sickle is done in two ways—reaping by wages, and reaping by piece.

Fig. 36.

REAPING BY WAGES.

a a are two ridges of corn, with three reapers on each. In the arrangement here a man is put on each ridge, supported by two women. The middle person makes the bands.
b is a band laid down to be filled with corn.
c is a band filled with corn, ready for binding into a sheaf.
d is the binder of sheaves going to set up a stook *e*.
e are the two first sheaves of a stook set up on one of the ridges.

A stook contains fourteen sheaves of wheat, and twelve sheaves of barley and oats. Sheaves in a stook are set two against each other. Hood-sheaves on the top of the standing sheaves are not now used except in very wet weather.

By piece, stooks are made of a definite number of sheaves.

By wages, stooks are made of any number of sheaves.

How is reaping by wages conducted?

Reaping by wages is done by placing six reapers, men or women, or both men and women, on two ridges, three on each ridge, of whom the one in the middle makes the bands, and the others reap the corn along the ridges, and lay it into the bands.

What is done with the corn in band?

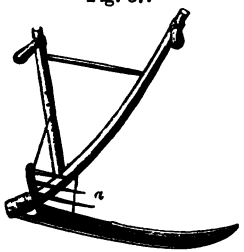
A seventh person, the binder, binds the corn into sheaves with the bands, and sets up the sheaves into stooks or shocks, upon one of the ridges.

How is corn cut by piece conducted?

By piece a ridge is given to each reaper, who makes the bands, and cuts down the corn. By piece, reaping is estimated by the thrave of two stooks. By piece, corn is reaped by the acre, the *contractor reaping it* in any way he pleases, and binds stooks. In

thraving, a binder follows to set up sheaves into stooks, or to bind sheaves and set them up into stooks.

Fig. 37.



CRADLE-SCYTHE FOR MOWING CORN.

How is reaping done with the scythe?

Three mowers with scythes form a set, and cut down the corn, along or across the ridges, as the wind may sway it.

The blade of a cradle-scythe for mowing is set in the same manner as that of the common scythe, fig. 29, page 39.

The use of the cradle *a* is to collect the corn as it is cut by the blade, and to keep it together until the mower lays the corn in swathe evenly upon the ground.

Who makes the bands for sheaves in scythe-reaping?

One woman makes bands in scythe-reaping after every mower, and puts the mown corn into them.

Who binds the sheaves, and sets the stooks?

One man binds the sheaves, and sets the stooks after every mower.

Is corn taken up cleanly after mowers?

Not quite. One person clears the ground with a large hand stubble-rake after every three mowers.

How are stooks set up?

Stooks of corn are composed of sheaves set two and two against each other, to any specified number of sheaves.

Are stooks set upon ridges at random?

By the thrave, stooks are set upon every ridge. By wages, and by the acre, stooks are set on every alternate ridge.

Is corn always bound into sheaves when reaped?

Damp oats are set into gaitins instead of sheaves, and bound into sheaves when removed to the stackyard.

In parts of England, barley and oats are allowed to remain on the ground in swathe, and are removed to the stack without being bound into sheaves.

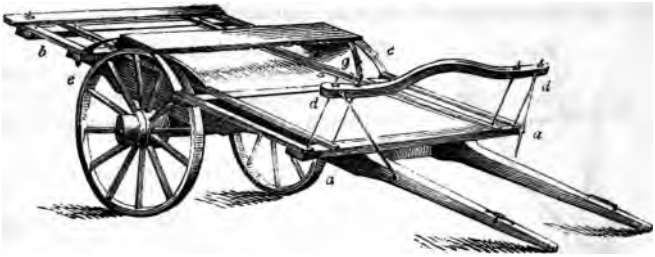
How is corn conveyed from the field to the stack?

Corn is carried from the field, to be stacked, on wheeled carriages.

Of what construction are wheeled carriages for carrying corn in the straw?

Waggons on four wheels are common in England, and carts on two wheels are common in Scotland, for carrying corn in the straw.

Fig. 38.



ONE FORM OF HARVEST-CART FOR CARRYING CORN IN THE STRAW FROM THE FIELD TO THE STACKYARD.

a a b is the body of a cart, with its two shafts mounted on the axle of wheels *e e*.
d d is a front rail, for keeping the sheaves off the horse in the shafts.
g are sides supporting a board which projects over the wheels *e e*, and upon which the carter stands to empty the cart of its load.

Several forms of carts with two wheels are used for carrying corn in the straw. A long rectangular cart, with sparred sides and framed top, is common in the south of Scotland. The common cart, with a frame on the top, is common in other parts of Scotland. Waggons with four wheels are more used in England than two-wheeled carts.

The figure gives a very convenient form of harvest cart.

How is corn loaded upon a harvest-cart of any kind?

The cart is brought up an open furrow, between two ridges, alongside a row of stooks. A man forks the sheaves to the carter in the cart, who places them with their stubble ends outwards, one row upon another, until a load is made. A rope is thrown across the cart from each corner behind, and secured in front to the shafts.

How is a loaded cart of corn disposed of in the stackyard?

The builder of the stacks forms a stool with straw, for the stack to stand upon the ground, when no permanent stools are erected in the stackyard. The carter forks the sheaves, one by one, from the cart to the builder, who builds the body of the stack of a cylindrical form, and finishes it with a conical top.

Are all corn-stacks made cylindrical?

Corn-stacks are built cylindrical, with a conical top, in Scotland. In England, corn-stacks are not unfrequently of an oblong form, with a triangular top.

How is corn in the stack protected?

Thatching of drawn straw is put on corn-stacks, to protect the corn from the weather. Thatch of corn-stacks is kept on with straw-ropes in Scotland. In parts of England, thatch of corn-stacks is secured with tarred twine and willow withes.

How are straw-ropes made?

Straw-ropes are made by one person twisting straw with a

twister, while another person, sitting, lets out the straw with his hands as the twister moves backwards.

How is a straw-rope put into a convenient form for use?
The spinner winds up the straw-rope into a coil.

How are straw-ropes placed upon stacks?
Straw-ropes are put in different fashions upon stacks—lozenge-shaped, net-meshed, and Border fashion.

Fig. 39.

A PRISMATIC-SHAPED BOSS FOR PREVENTING HEAT IN STACKS.

Does corn run any risk on being stacked?
Straw of corn is apt to heat in stacks, before moisture has been sufficiently dried out of it.

What effect has heating upon corn and straw?
Heating discolours grain, and gives a bitter taste to it. Heating rots straw.

What prevents heating in stacks?
Heating is prevented by building stacks around frames of wood, which, supporting their tops, relieve pressure upon the parts below.

A pyramidal-shaped boss cannot sustain the weight of the upper part of a stack, because of its upward pointed form.

TUPPING EWES, AND BATHING SHEEP.

In a breeding flock of ewes, when is a tup put amongst them?
In the low country the tup is put to the ewes in the early part of October. In the hill country the tup is put to the ewes in November.

How are ewes treated before having the tup?
Ewes, prior to being tupped, are put on a piece of fresh rape, or fresh clover aftermath.

Are not sheep bathed or smeared before being put on turnips in winter?
Sheep in the low country are bathed. Sheep in the hills are smeared before winter. Bathing and smearing prevent annoyance to sheep from ticks, and injury from scab.

How is the bath put on sheep?
Bath is put on sheep by a person pouring it out of a vessel along the sheds of wool opened by the shepherd. Sheep are bathed by being dipped, back downwards, in a tub of prepared bath, and dripped over another tub.

How are sheep smeared?
Smearing is put on the skin of sheep by the fingers of the shepherd passing along sheds of wool.

LIFTING POTATOES.

When are potatoes taken out of the ground?

Potatoes are taken out of the ground in autumn, after corn harvest.

How are potatoes taken out of the ground?

Potatoes are taken out of the ground by hand with a potato-graip. Potatoes are taken out of the ground with the ordinary plough, or with a plough made for the purpose.

How is the potato-graip used in lifting potatoes?

The potato-graip is used as a spade by a man, who pushes it into the side of the drill, and, on raising the potato-plant, turns up the potatoes to the surface. A woman follows, and gathers up the potatoes in a basket. The basket, when full of potatoes, is emptied by her into a cart placed near at hand, or into sacks.

How are potatoes lifted with the plough?

The coulter is removed, because it might cut the potatoes. The plough is entered at one end of a drill, at its side, and turns up the earth with its contents of potatoes, with the mould-board. Women gather the potatoes in the same manner, and put them into the carts, as after the potato-graip.

Two sorts of ploughs have been constructed for lifting potatoes. One is furnished with a double mould-board, formed of ribs like a brander. The other plough has common mould-boards, and two bars of iron spreading out the width of the drills at an angle upwards from their attachment to the sole-shoe of the plough.

What is done with potatoes after being lifted?

Potatoes, on being lifted, are stored in pits, which are low triangular piles placed upon a piece of dry ground. A thick layer of straw covers the pits. Earth is put upon the straw with a spade, and beaten smooth.

Are potatoes lifted in any state of weather?

Potatoes are not lifted in rain or frost.

ROTATION OF CROPS.

What is understood by a rotation of crops?

A certain number of crops of different kinds following in the same order, on the same ground, constitutes a rotation of crops.

Why are different kinds of crops taken in succession on the same ground?

Because the same kind of crop, requiring the same kind of food, if taken in succession on the same ground, would exhaust *the food in that ground*, and die for want of it.

Would not a renewal of manure support the same kind of crop on the same ground for an indefinite number of years?

Manure renewed on the same piece of ground supports the same kind of crop on the same ground for an indefinite period; but, in cropping thus, the food which would support a number of other kinds of crops, must remain unused in that ground, and be so much food wasted.

What other advantage besides an economic use of plant-food, does a rotation of crops procure?

Where a given number of cattle and sheep are bred upon a given extent of ground, a rotation of crops secures their food summer and winter, in quantity and variety.

Is the same rotation of crops followed on all sorts of farms?

A farm situated in the neighbourhood of a town follows a different rotation of crops from a farm at a distance from a town.

Does the same rotation of crops answer every sort of soil?

Strong and light soils require different rotations of crops.

What is the ordinary succession of crops?

The ordinary succession of crops is a green crop after a grain crop.

Are grain-crops changed in succession?

Grain-crops are changed in succession. Wheat, barley, and oats are taken in succession on the same ground.

Are green-crops changed in succession?

Green-crops are changed in succession. Turnips, mangold-wurzel, potatoes, sown grasses, forage plants, are taken in succession on the same ground.

What is a common rotation of grain and green crops?

A common succession of crops is, one year of green crops, as sown grasses; one year of grain crops, as oats in Scotland, and wheat in England; one year of green crops, as potatoes, turnips, mangold-wurzel, tares, rape; and one year of grain crops, as wheat and barley. This succession is named a four years' rotation.

Can a four years' rotation be modified?

A four years' rotation is modified by allowing a part of the sown grasses to remain two years, by which a five years' rotation is obtained. By allowing sown grasses to remain three years, a six years' rotation is obtained.

Is a modification of a four years' rotation possible by extending the grain-crops?

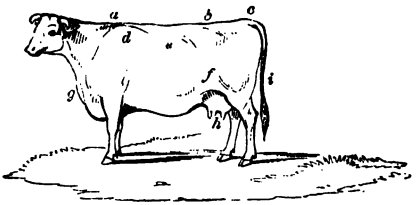
By taking beans after oats in Scotland, and after wheat in England, followed by a crop of wheat, a rotation of four years is extended to one of six. In addition to this, by having sown grasses three years, the six years' rotation is extended to one of eight years.

What is the marked distinction between a rotation of crops on strong and on light soils?

On strong soil a greater proportion of grain-crops are cultivated than of green-crops. On light soil a greater proportion of green-crops are raised than of grain-crops.

Is a relative proportion between grain and green crops, in a rotation, desirable?

Where live-stock is bred and reared upon an arable farm, the nearer the grain and green crops bear the proportion each of one-half the arable land, the better for the live-stock.



Short-horn Cow—Kilmeny.

Back straight from *a* to *c*; hook-bones level and broad at *b*; tail-head level at *c*, and tail perpendicular by *i*; well filled-out behind the shoulder at *d*; ribs round at *e*; flanks deep from *b* to *f*; brisket prominent at *g*; and udder *h* finely formed, and quartered.

The head is remarkably fine, furnished with slouching horns; the skin of fine quality. The body is long, which is a good point in a brood cow. Kilmeny was a superior cow in every respect. She belonged to the Duke of Buccleuch. Her pedigree was high. She was got by Matchem, dam by a son of Mr Collins' George, granddam by Winyard. Her colour was roan.

APPENDIX.

THE subjects treated of in the preceding pages are the crops and animals usually cultivated and reared on the arable farms of Great Britain. Other crops are also raised upon farms, which are not neglected to be done when desirable, and these therefore should also be treated of in this Catechism; but not being constantly cultivated, it is conceived better to treat them apart in an Appendix than to include them in a system of cultivation of which they do not form a necessary part; and were they so included, the mind of the pupil might probably be impressed with the idea that they really formed an integral portion of ordinary farming. Works are also performed at particular periods of a lease, and in particular states of a farm, which are never repeated. Such works are—draining, liming, and making of fences, any of which will not be required to be done by a person other than the one who originally executed them. On this account, it is better to treat these also in an Appendix.

DRAINING LAND.

What is the object of draining land?

The object of draining land is to remove from it all superfluous moisture, that, remaining, would injure the growth of plants.

How is draining of land best attained?

Draining of land can best be attained by making lines of permanent cuts at considerable depths in the subsoil, into which the superfluous water finds access and flows away. Such permanent cuts are named drains.

What is the cause of moisture remaining in superfluous quantity in the soil?

Rain falling, finding no channels for descent in the soil, remains in it until evaporated by the heat of the air.

Does every kind of soil arrest the descent of rain in it?

Porous soils and subsoils allow the rain to descend through them. Light soils and subsoils are porous. Heavy soils and *subsoils* retain the rain in them.

Do heavy soils alone require draining?

Light soils upon heavy subsoils require draining as much as heavy soils.

How is arable land drained?

Arable land being in fields, each field is drained by itself. Arable land being in ridges, their direction guides that of the drains.

How is a field drained?

The surface of every field having an inclination in some direction, drains are made to lead the water to the lowest point of the field.

What is the first operation in draining a field?

The first operation in draining is to ascertain the direction and amount of fall for the water to the lowest point of the field by a spirit-level, if the eye cannot certainly see it.

What is the next operation to ascertaining the fall of the ground?

The next operation to the fall of the ground is to ascertain the nature of its subsoil, because it is it which determines the depth and number of drains.

How is the nature of subsoil best ascertained?

The nature of subsoil is best ascertained by cutting exploratory drains of increasing depth through it, from the lowest to the highest part of the field.

Whatever the subsoil, is there not a minimum depth to every drain?

No drain should be of less depth than to allow free operation of the deepest culture.

What should be the minimum depth of a drain to allow of culture?

Subsoil trenching-ploughs go down 20 inches; the materials filling a drain occupy 6 inches; allowing 6 inches between the top of the materials and the base line of the plough, the minimum depth of a drain is 32 inches.

What says experience on the depth of drains?

Experience has proved that drains from 3 to 4 feet in depth secure the drying of most soils.

What says experience of the distance betwixt drains when their depth is from 3 to 4 feet?

Experience has not yet determined the most drying distance between drains. In porous subsoils, the drying distance is perhaps 30 feet. In retentive subsoils, the drying distance is perhaps 12 feet.

How is draining of a field commenced?

Exploratory drains through the subsoil, having determined the *depth and distance* of drains in the particular field, a main drain

is formed at the lowest end of the field, across its entire breadth, to carry off the drainage-water from the small drains. The main drain is 6 inches deeper than the small drains.

What is done after making the main drain?

After the main drain, small drains are made from it to the upper end of the field, in parallel lines, at distances determined by the exploratory drains.

How are drains constructed?

Drains are cut with a spade to the requisite depth, as narrow as possible. The conduit for conveying water is placed at the bottom of the drain. Earth is returned above the conduit, and finishes the drain.

Of what material is the conduit of drains?

The material for conduits is most commonly tiles. Small stones were used before the invention of drain-tiles.

Of what form is a drain-tile?

Drain-tiles are arched, and are used with separate or attached soles. Tiles with attached soles are pipe-tiles.

How are separate tiles and soles used?

Separate soles are flat, and placed end to end. Separate tiles are placed upon flat soles, so as the joinings of the tiles shall rest upon the middle of the soles.

Fig. 40.

TILES AS THEY SHOULD BE SET UPON FLAT SOLES.

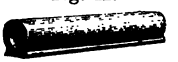
How are pipe-tiles used?

Pipe-tiles are of two forms—one a cylinder, the other egg-shaped, with a flat bottom. The cylinder pipe-tiles are placed end to end, and kept together by means of a collar. The flat-bottomed pipe-tiles are placed end to end without a collar.

Fig. 41.

CYLINDRICAL PIPE-TILE WITH COLLAR.

Fig. 42.



EGG-SHAPED PIPE-TILE WITH FLAT BOTTOM.

Were it not for the collar, the cylinder-shaped pipe-tile would be apt to roll over on its side, out of the line of conduit. The collars enhance the cost of the cylinder pipe-tiles one-half.

The flat-bottomed pipe-tile stands firmly upon its bottom. The egg-shaped opening being small at the lower end, promotes the clearing away of sand or mud with the smallest run of water. Its broad upper end admits room for a larger quantity of water when it comes.

The form of the bores of pipe-tiles varies considerably.

How is earth returned into drains upon the tiles?

Part of the earth is put in with the spade, and the remainder with the plough.

How are bogs drained?

Drains in bog are cut to a certain depth, and then left for the

bog to shrink. Another depth is then cut down, and the bog again left to shrink. At length the bottom of the drain is cut out at the required depth.

With what material are drains in bog filled?

The peats which had been cast out with the spade in the first and second cuttings having become hard by exposure to the air, are returned into the drain as the material for filling it.

How are drains in upland pasture made?

Drains in upland pasture are made of two forms,—one open, the other covered. Both are sheep-drains.

How are open sheep-drains made?

The turf is cut with the spade to the breadth of the drain, and is placed upon its side, with the grassy face outwards, on the lower edge of the drain. The soil taken from the bottom of the drain is thrown upon the top of the turf, to be afterwards sown with grass-seeds.

How are covered sheep-drains made?

A thick turf is taken out with the spade, of the breadth of the drain; earth is then taken out to form the bottom of the drain into a narrow channel; the thick turf is replaced where it grew.

How is upland pasture drained for cattle?

Tile-drains are best adapted in upland pasture for cattle.

Is draining executed at all seasons of the year?

Winter is the best season for draining hard lands, when the ground is soft, and the fields unoccupied by labour and live-stock. Bogs are best drained in summer.

THORN HEDGES.

Of what use are thorn hedges?

Thorn hedges make an efficient fence for the fields of a farm.

What is the best arrangement of labourers for making a thorn hedge?

Three men—the hedger and two men—are best to work together in making a thorn hedge. The tools they use are—common spades, a ditcher's shovel, a hand-pick, and a garden line.

How is a line of hedge laid off?

A straight line of hedge is laid off with feering-poles, and the garden line stretched along the row of feering-poles. A rut with a spade marks the line of hedge. A curved line for a hedge is marked out with pins.

How is the bed for thorn plants made?

The upper soil is removed with the spade by the two men

across the breadth of the ditch, upon the line of hedge, and put into the shape of a thorn bed by the hedger. In preparing a thorn plant, its stem is cut over with a knife about 6 inches above the roots, and the longer roots are cut short, preserving the fibres.

How is a prepared thorn-plant placed in its bed ?

The bed for the thorn plant has an inclined surface upon which the stem of the plant is laid by the hedger, with the roots away from the ditch. The two men follow, and heap upper soil upon the laid plant from the ditch. The hedger then treads the earth firm over the plant, and smoothes the face of the bed with the ditcher's shovel.

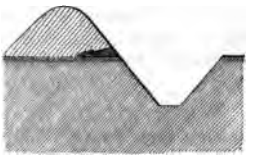
What is done next ?

While the hedger is employed in finishing the thorn bed, the two men are employed with the subsoil in the ditch, one loosening it with the hand-pick, the other throwing it upon the top of the thorn bed with the spade.

What does the hedger after finishing the thorn bed ?

The hedger then follows the men, and shovels the loose subsoil upon the top of the thorn bank, and claps the face of the thorn bank smooth with the shovel, and finishes the hedge-planting.

Fig. 43.



SECTION OF HEDGE-BANK AND DITCH FINISHED.

What is the best season for planting thorn-hedges ?

Thorn hedges are planted from the end of autumn till the middle of spring. In rainy weather and hard frost, planting of thorns is deferred.

Are there other modes of planting thorns than laying them in beds ?

Thorn plants are planted upright in the soil, and, where the soil is deep, and subsoil dry, the plants grow rapidly.

How is a young thorn-plant treated ?

A young thorn-plant is not pruned, and is allowed to grow till it has established a large quantity of roots and leaves, when the points of the most forward branches are lopped off with the switching hedge-bill.

How is a young thorn-hedge protected ?

A young thorn-hedge is protected with a wooden paling of two or three rails, according as it is desired to fence off cattle or sheep.

When does a thorn hedge become useless as a fence ?

A thorn hedge, allowed to grow until it becomes bare near the *ground, is useless* as a fence for sheep.

How is a full-grown thorn-hedge breasted over?

The hedger, standing upon the face of the ditch, below the root of the hedge, with his back to the hedge, cuts, in a back-handed stroke, with a hedge-bill in his right hand, through the stems in an upward direction, about 2 feet from the ground, and lays the cut-off thorns upon the edge of the ditch.

Is any use made of the cut thorns?

Cut thorns are used in making a dead hedge as a temporary fence, to protect a new hedge, a breasted hedge, or to separate two parts of a grass field.

Does the bank of a thorn hedge ever decay?

In weeding a young hedge in summer, the earth is taken away from the bank into the ditch. When a hedge is breasted over, the earth is replaced below and around the roots of the hedge, and upon the bank. This process is named water-tabling.

Is an old thorn-hedge ever cut down to the ground?

When an old hedge becomes tall, heavy in the head, and bare in the stem, it is cut down. The hedger, standing upon the ditch face, below the root of the hedge, and facing it, cuts through with both hands, with an upward stroke of the hedger's axe, the thick stems of the thorns close to the ground, and lays the cut-off stems on the edge of the ditch.

What is the best mode of weeding young thorn-hedges?

Weeds are taken away from the face of the ditch by the hedger with a hedge-spade. Weeds are removed from the hedge bank by women, with a Dutch hoe, into the ditch.

DRY-STONE WALLS.

Is a dry-stone wall a good fence for fields?

Dry-stone walls make an efficient fence for fields.

How are lines of dry-stone walls set off?

Lines of dry-stone walls are set off with feering-poles, and fixed by stakes driven into the ground.

What is the best stone for building a dry-stone wall?

The body of a dry-stone wall is best built with flat stones having a rough surface. The foundation of a dry-stone wall is best formed of large stones, as boulders.

Of what construction is a dry-stone wall?

A dry-stone wall may be either single or double. A single dry-stone wall is built against a bank of ground, with one face. A double dry-stone wall has two faces, and stands by itself. Double dry-stone walls are most common fences for fields.

How are stones laid down for a dry-stone wall?

Stones for a double dry-stone wall are laid down by cart-loads *along each side of the* line.

How is a dry-stone wall best constructed?

One dry-stone builder is sufficient for a single dry-stone wall. A double dry-stone wall is best built by two builders, one opposite to the other.

How are stones placed in a dry-stone wall?

Large stones are placed in the foundation, and flat stones are laid horizontally upon them, so as to break band with those above and below—the heart of the wall being well packed with smaller stones.

What constitutes the parts of a dry-stone wall?

A dry-stone wall consists of a body, a flat cover, which protects the top of the body, and a coping of stones set on edge upon the cover.

What is the usual height of a dry-stone wall?

An ordinary dry-stone wall is usually 3 feet in height in the body. A cope stands 1 foot in height. A dry-stone wall is altogether 4 feet in height. A dry-stone wall as a march fence is not less than 5 feet in height.

FIELD-GATES.

Of what use is a gate to a field?

A gate permits live-stock and carts to go out and in to a field, and completes its fences.

Of what materials are field-gates made?

Field-gates are commonly made of wood, sometimes of iron.

Should a field-gate be of particular form?

A field-gate should be constructed of one piece, for convenience in opening and shutting.

Is there any construction of field-gate, in one piece, better than another?

A field-gate of one piece is so constructed that its fore-stile shall not drop.

What construction prevents the fore-stile of an iron or wooden field-gate dropping?

A diagonal strut in a wooden gate, and a stay in an iron one, prevents the fore-stile dropping.

a b is a strut crossing the diagonal of the gate from the heel-post *a* to the top of the fore-stile *b*, keeping up the top-rail *c b*, and preventing the dropping of the fore-stile *b d*.

A stay from *c* to *d* would much resist the twisting of the gate.

The spaces between the *posts and rails* may be filled *up in any way.*

Fig. 44.

A STRUTTED WOODEN FIELD-GATE.

IRRIGATION.

What is irrigation?

Irrigation is the passing a slow current of water in a given time over the surface of grass.

What effect has a slow current of water passing over arable land?

A current of water, whether slow or fast, passing over arable land, carries away with it the finest portion of the soil.

What is the state of water used in irrigation?

Pure and foul water are both fit for irrigating grass.

What effect has irrigation on grass?

Irrigation excites vegetation in grass.

Has pure or foul water the greater effect upon grass in irrigation?

Manure water produces a much larger crop of grass in irrigation than pure water.

How is water applied to grass in irrigation?

Water is applied to grass in irrigation by altering the natural surface of the ground, so as to cause water to flow over it gently and equally.

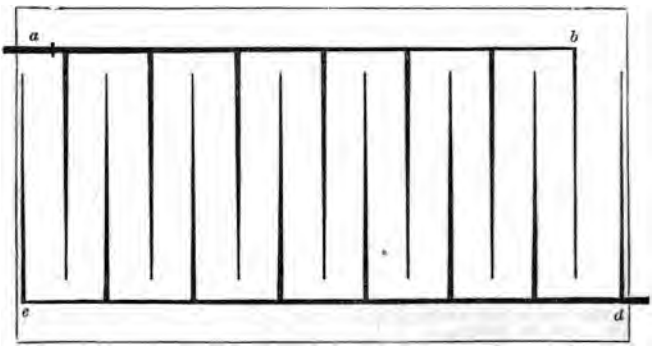
How is the surface of the ground altered so as to cause water to flow over it gently and equally?

The surface of the ground is altered to the form of water-meadows.

What is the form of water-meadows?

Water-meadows are of two forms,—one for smooth surfaces of ground, named bed-work; the other for irregular surfaces of ground, named catch-work.

Fig. 45.



A BED-WORK WATER-MEADOW.

a b is a main conductor, which brings water to a bed-work meadow.

c d is a main drain, which carries away water from a bed-work meadow.

The channels issuing from the main conductor *a b* convey the water from it, along the elevated crowns of the beds. The narrowing form of these channels, towards their point, in the direction of the run of the water, causes the water in them to overflow both sides of the beds to the channels in the hollows between the beds. The channels in connection with the main conductor *a b* are named feeders.

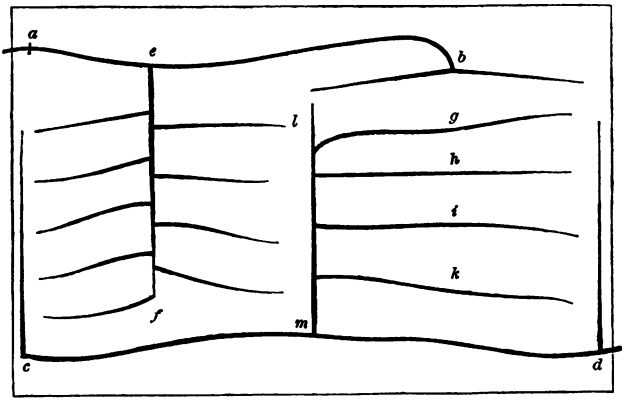
The channels joining the main drain *c d* carry the water into it, from the hollows between the beds, after they have been irrigated by the water conveyed by the feeders. These channels are named drains. The drains increase in width as they approach the main drain *c d*.

The main drain *c d* should carry away as much water in a given time, as the main conductor *a b* brings it forward.

What is the form of bed-work water-meadows?

Bed-work irrigation consists of one set of regular surface-drains, bringing water upon a meadow, and another set of regular surface-drains, taking water away from a meadow.

Fig. 46.



A CATCH-WORK WATER-MEADOW.

a b is a main conductor, which brings water to a catch-work meadow.
c d is a main drain, which carries away water from a catch-work meadow.
e f is a feeder, along the highest ridge of a gentle slope of the ground, supplying water to all the sub-feeders branching from it.

At *b* are two feeders, which send their water down a steep bank, across the face of which is placed a sub-drain *g*, to receive the water; but the sub-drain *g*, when it overflows, becomes a sub-feeder to the sub-drain *h*, which, in its turn, sends the water to *i*, and it, in its turn, sends the water to *k*. The surplus water from all these sub-drains finds its way into the drain *l m*, which conveys it into the main drain *c d*. A drain at *c*, and another at *d*, at the two sides of the meadow, convey any water that finds its way into them.

What is the form of catch-work water-meadows?

A catch-work water-meadow consists of channels conveying water to the higher parts of ground that command the larger surfaces below them; and of channels in every hollow, to convey water away as fast as it comes into them.

Is water put upon a water-meadow at random?

Water sent into a main conductor of a water-meadow is regu-

lated by a sluice. Water in the feeders of a catch-work water-meadow is made to flow regularly by obstructions placed in them.

Is irrigation of a water-meadow proper at all seasons?

Winter is the best season for irrigating a water-meadow.

Is irrigation of a water-meadow proper in all states of weather?

It is improper to have water on a water-meadow in winter, when frost is so severe as to freeze running water.

Is water ever allowed to remain in a stagnant state upon a water-meadow?

Water remaining stagnant on a water-meadow destroys grass. Grass is not injured as long as water flows over it.

Does irrigation injure the subsoil?

Irrigation injures grass where the land requires and has not been thorough-drained. Under-drains absorb the water left in the surface-drains, and prevent its stagnation.

How is the irrigation of a water-meadow conducted?

Water is allowed to flow over a water-meadow for only two or three weeks at a time, when the grass is allowed to grow. When the grass is sufficiently grown, after repeated irrigations, it is mown for green forage or hay. Water is made to flow over the aftermath, which, when grown, is mown down. The aftermath is again irrigated, and again mown, till the end of the grass season.

IMPROVEMENT OF WASTE-LAND.

How is waste-land most effectually improved?

The first step to the effectual improvement of waste-land is thorough-draining. The second step in the improvement of waste-land is deep-ploughing.

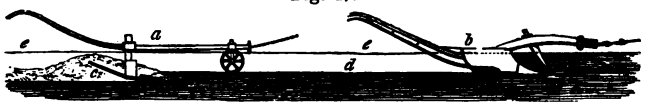
How is deep-ploughing effected?

Deep-ploughing is effected by a combination of trench and subsoil ploughings (page 4).

How are trench and subsoil ploughings best effected?

The Tweeddale trench and subsoil-trench ploughs effectually stir and mix the soil and subsoil to the depth of 20 inches.

Fig. 47.



TWEEDDALE TRENCH AND SUBSOIL-TRENCH PLOUGHS DEEP-PLOUGHING LAND.

b is the trench-plough going before with *four horses, and turning* over a furrow *of 15 or 16 inches in depth e d.* *a* is the trench-subsoil-plough following in the same furrow, with four horses, and going from 4 to 6 inches deeper

than the trench-plough *b*, making the furrow from 19 to 22 inches in depth, and mixing the subsoil with a portion of the upper soil by means of its share and tail-board *c*.

e d is the depth of the furrow made by the trench-plough *b*.

e c is the depth of the furrow made by the combined action of the trench and subsoil-trench ploughs *a* and *b*.

Describe the combined action of the Tweeddale trench and subsoil-trench ploughs.

The Tweeddale trench-plough goes before with four horses and two men, and breaks up the land to the depth of 15 or 16 inches, with a rectangular furrow-slice of that thickness, and 14 inches in breadth. The subsoil-trench-plough follows in the same furrow with four horses and two men, and stirs the subsoil 16 inches in breadth, and from 4 to 6 inches deeper than the trench-plough, mixing it, at the same time, intimately with a portion of the upper soil.

What is the immediate effect on the soil and subsoil by the combined action of the Tweeddale trench and subsoil-trench ploughs?

The immediate effects of the Tweeddale trench and subsoil-trench ploughs are, first effectually to pulverise both soil and subsoil to a depth of 20 inches on an average, while mixing the subsoil intimately with a part of the upper soil, and leaving the top of the upper soil unmixed.

Are any obstructions met with in deep-ploughing land?

Boulder-stones are met with at different depths and of different sizes in deep-ploughing land. Boulder-stones are removed by hand when met with in deep-ploughing.

What is the state of the upper soil after Tweeddale deep-ploughing?

The upper soil of Tweeddale deep-ploughed land is at once ready to be prepared for any crop, whether a grain or green crop.

Is Tweeddale deep-ploughing applicable to arable as well as to waste land?

Tweeddale deep-ploughing is equally applicable to arable as to waste land. If it has been first employed on grass land, the first crop should be oats, to reduce the turf. If first on bare land, the soil may be prepared at once for turnips.*

LIMING.

When is lime used upon land?

Lime is used on land either in bare-fallow or with a green-crop fallow.

When is lime used in bare-fallow?

Lime is laid upon bare-fallow land immediately before the wheat is sown in autumn.

* A particular account of the Tweeddale deep-ploughing will be found in my small volume on *Yester Deep Land-Culture*, by W. Blackwood and *Sons.*

When is lime used in green-crop fallow?

Lime is laid upon land after a green crop, immediately before the grain crop is sown in spring.

Is lime given to different kinds of soil in the same quantity?

Strong soils receive more lime than light soils.

Is lime given to the same kind of soil in definite quantities?

The quantity of lime given to the same kind of soil differs much in different parts of the country.

In what state is lime laid upon land?

Lime is laid upon land, either in small heaps in the state of shell, along feered ridges, or spread along feered ridges in the slaked powdered state, with frying-pan shovels, from the cart.

Fig. 48.

A FRYING-PAN SHOVEL.

A frying-pan shovel is of very convenient form for spreading any substance in a state of powder, or for shovelling clean the bottom of heaps.

How does lime operate upon soil?

Lime acts both mechanically and chemically upon soils. Lime acts mechanically in pulverising strong clay soils. Lime acts chemically on soils which contain much vegetable matter.

Does lime act as a manure in the soil to plants?

Lime, by its action on vegetable and acid substances in the soil, converts them into manure for plants.

Is lime given frequently to the same soil?

Lime is commonly given to land in large quantity, at long intervals of time. It is recommended to give lime to land frequently, and in small quantity.

FLAX.

Is flax commonly cultivated on farms?

Flax is little cultivated in England and Scotland, but largely in Ireland.

How is the cultivation of flax conducted in spring?

Land is pulverised very fine for flax. Land is rolled smooth before flax-seed is sown. Flax-seed is sown broadcast, very thick, and covered with very little earth.

How is the culture of flax conducted in summer?

Flax-plants, while young, are weeded by hand.

How is flax reaped?

Flax is pulled up by the roots with the hand. Flax-seed is rippled from the straw. Flax-straw is dried in the air, tied into sheaves, and stacked.

Is flax ever steeped in water?

Flax, as pulled, is rippled, tied into bundles, and put into

water to steep; after which it is spread upon grass to dew-ret and dry. Breaking and scutching the flax-straw, after being dried, converts it into flax.

How is flax-seed rippled?

A rippling-comb, for separating bolls of flax-seed from the straw, consists of a row of sharp-pointed steel needles set upright upon a board. Flax, as pulled, is combed through the ripples, when the bolls separate from the straw.

What is done with bolls of flax-seed?

Bolls of flax-seed are dried, and the seed thrashed out for use or sale.

Is any use made of flax bolls with their seed?

Bolls with seed are good food for cattle. Flax-seed is a rich food for cattle.

How is fine flax obtained?

Fine flax is obtained by growing the crop very thick, and pulling it while yet a little green.

How is fine flax-seed obtained?

Fine flax-seed is obtained by growing the crop very thin and branchy, and allowing the seed to ripen fully.

Does flax bear manuring?

Manure causes flax to grow coarse and tender. Flax is never manured, but a top-dressing of bone-dust upon the young plants makes the flax finer.

Does flax interfere with a rotation of cropping?

If flax is raised after a grain-crop, it is of good quality, but it exhausts the ground. If flax is raised after grass, it is good, but it then comes into direct competition with a grain crop. If flax is raised as a green crop, it is coarse.

What sort of soil is best suited to flax?

Flax may be cultivated on any sort of soil but peat and gravel.

CARROTS.

Is the carrot much cultivated on farms?

The carrot is not a common crop on farms.

What sort of soil is best suited to the carrot?

The carrot, having a long root, grows best in deep, free, light soil, such as sand.

Does the carrot require manure?

The carrot requires the manure to be deeply buried, otherwise the root is apt to fork.

How is the culture of the carrot conducted in spring?

Land for the carrot should be well pulverised. Carrot-seed,

being light, dry, and rough, is mixed with damp sand before being sown.

Is the carrot cultivated in rows, or broadcast?

The carrot is cultivated in rows or broadcast. The seed is lightly covered with earth. Young plants of carrot are thinned out to a distance. The carrot crop is weeded in summer.

How is the carrot taken out of the ground in autumn?

The carrot is taken out of the ground by means of graips, in order to preserve the roots entire.

Is the carrot stored?

Carrots are stored in outhouses, in autumn, among dry sand.

Of what use is the carrot?

Carrots are much used in domestic cookery. Carrots are given to horses, which are very fond of them.

Are there different varieties of the carrot?

There are varieties of the carrot for garden and field culture.

CABBAGES.

Is the cabbage commonly cultivated on a farm?

The cabbage is not a common crop on a farm. The drumhead variety alone is cultivated on farms.

What sort of soil is best suited to the cabbage?

A strong rich clay soil is best suited for cabbage.

Does the cabbage require manure?

The cabbage requires a large quantity of manure, directly applied.

What is the culture best suited to the cabbage?

The best culture for the cabbage is on well-manured drills, like the turnip.

Whether is cabbage-seed used, or young cabbage-plants transplanted on the drills?

Transplanting young plants on drills is the best way of raising cabbage.

How are young cabbage-plants prepared for transplanting?

Cabbage-seed is sown in a bed in the garden, and the plants are removed for transplanting at the end of spring. In summer the ground is cleared of weeds.

How is cabbage taken from the ground?

Cabbages are pulled up by the roots when used.

What use is made of cabbage?

Cabbage is an excellent food for cows in winter, and after *they have calved.*

Are cabbages stored?

Cabbages are stored, as frost destroys their leaves. Cabbages are best stored by being hung up by the roots in a shed.

SPECIAL MANURES.

What is a special manure?

A special manure is any substance that supplies a particular ingredient of any plant.

How is a special manure applied, that a plant may derive advantage from it?

All special manures are given to plants through the medium of the soil.

How are the ingredients of a plant made known?

All the ingredients of plants are made known by chemistry.

What is the nature of the ingredients of plants made known by chemistry?

Chemistry has made known that the ingredients of plants are of two natures; one inorganic, the other organic.

How do plants acquire their inorganic ingredients?

Plants acquire their inorganic ingredients from the soil.

How do plants acquire their organic ingredients?

Plants acquire their organic ingredients from the air and soil.

Does a special manure supply an organic, or an inorganic ingredient to a plant?

A special manure supplies an inorganic ingredient to a plant.

Of what nature is an inorganic ingredient of a plant?

An inorganic ingredient of a plant is mineral.

Do the same mineral ingredients occur in all plants?

Most mineral ingredients occur in all plants, whether cultivated or natural.

Do mineral ingredients vary in different classes of plants?

Mineral ingredients vary materially in different classes of plants.

Do mineral ingredients vary in different seasons in their proportions in the same class of plants?

Mineral ingredients vary materially in proportion in different seasons in the same class of plants.

Does a particular mineral ingredient assume a prominent position in any class of plants?

A particular mineral ingredient gives a character to each class of plants.

What is the difference of character derived from a mineral ingredient in our cultivated plants?

The grain plants have one character from one kind of mineral ingredient; turnips have another character from another mineral ingredient; so have potatoes; so have clovers; and so with other plants.

Has chemistry made known to us the special manure best suited to each class of cultivated plants?

It has.

Is guano a special manure?

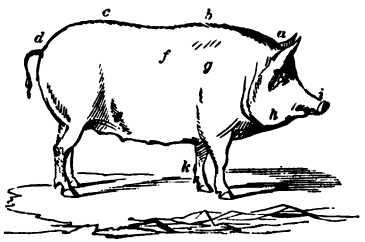
Guano is a special manure, because it supplies one matter largely which forms an essential ingredient in all plants, namely, ammonia.

Is bone-dust a special manure?

Bone-dust is a special manure, because it supplies largely an essential ingredient of all plants, namely, phosphoric acid and its compounds.

Is farmyard manure a special manure?

Farmyard manure is not a special manure, because it supplies all the ingredients of a plant.



Brood Sow.

The neck from *a* to *b* full; the back from *b* to *c* broad; the rump from *c* to *d* full and round; the ribs *f* round; behind the shoulder *g* filled up; the flank from *c* to *e* deep and filled up; the shank *k* small, short, and finely tapered. The value of the head is indicated by the enlargement of the muscle of the cheek *h*.

The ears are erect, eye clear, muzzle fine, back straight and equally broad, and the body rectangular in form.

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